THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The marked activity in pig iron which prevailed throughout July, and in the early days of August seemed to have slackened, is strongly in evidence this week. What is more, some furnaces have advanced their prices for next year's delivery under the continued and well-distributed buying. Consumers of iron appear to be making up their minds that furnace capacity is not so much the determining factor in the account as fuel supply. The handicap in this particular is still pronounced. While the supply of coke from the Virginias is slightly better the anthracite situation is unchanged, and Eastern furnaces are negotiating for coke from districts apart from the Connellsville for the first half of next year on the basis of $2.75 at the oven, equivalent to $3 for Connellsville coke. The example of large users of foundry iron who have bought their supply for the first half of 1903 is being followed by others whose wants are smaller and who have naturally hesitated to pay the high prices everywhere asked. Cincinnati, Pittsburg and Chicago have been busy markets in foundry iron, and Buffalo has made good sales for delivery in the East as well as in Western New York. The movement has brought rather higher quotations than those of a week ago, particularly on Southern soft, Southern Ohio high silicon and Lake Superior charcoal irons. Cincinnati offices have sold 65,000 to 70,000 tons in the week, largely Southern foundry, besides basic and charcoal. Pittsburg reports 15,000 tons of No. 2 foundry sold at from $21.75 to $22.25 for the first half of 1903. The steel corporation is reported to be seeking considerable amounts of basic and forge irons for the last quarter of this year and the first quarter of next year, but no purchases are reported. Contracts for Bessemer iron by the Steel Corporation for the second quarter of 1903 are still in abeyance. It is a question if the Valley furnacemen will be able to deliver the iron they have sold for the first quarter after taking care of the business they must carry over from this year. The fact that prominent Southern furnaces have ceased selling for the first half of 1903 indicates both the extent of the forward buying and the care of producers to prevent a repetition of the peculiar Southern situation of 1902. The minimum is now $17 for No. 2 Southern and $17.50 is asked in some cases; less frequently $18. The market for steel is closely watched for signs of further weakening in foreign prices. Chicago notes a sale of 5,000 tons of import steel delivered to a Central Western buyer at $30.50. The reports concerning the Union Pacific and Southern Pacific purchases of foreign rails are not entirely accurate. It is stated that 40,000 tons for far westeern portions of the line went abroad and are for delivery early next year via Pacific Coast, while 60,000 were placed with mills in the United States for sections nearer the interior. The Canadian Pacific is reported to be negotiating for 50,000 tons of foreign rails. Structural concerns are still heavy buyers of shapes for next year's work, the Chicago tonnage of the week being 20,000 to 30,000 tons. The condition of tin plate, sheet and wire and wire nail mills is quite in contrast with that in the heavier forms of finished steel. Wire mills are accumulating stock for the expected activity in the fall, but sheets and tin plates are coming on rather quieter conditions. Bars are stronger in Western markets and the lowest recent quotations on iron are now withdrawn at Chicago.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, August 13.

The market has displayed considerable activity in the past week and large sales of both heavy finished and raw material have been recorded. The buying for immediate requirements is extremely limited, but consumers are anxiously covering for the first half of next year despite the high prices ruling in many lines. Foundry iron has again been extremely active, Northern furnaces reporting sales of fully 15,000 tons of No. 2 for delivery the first half of next year at prices ranging from $21.75 to $22.25 Pittsburg. A number of the Northern furnaces have already withdrawn from the market, having sold their entire output for the first half of next year, while the Tennessee Coal, Iron & Railroad Co. and the Sloss-Sheffield Steel & Iron Co. have notified the trade that they are entirely sold up on the softer grades of foundry iron for the first half of 1903. There was considerable buying of Southern foundry in this market the past week, sales aggregating 7,000 tons, at prices ranging from $21.65 to $22.15, delivered Pittsburg. The pig iron committee of the United States Steel Corporation last week received offers on basic and forge iron, but owing to the high prices asked by the furnaces no iron was purchased. As yet the Valley Bessemer Association has not been asked to fix a price for Bessemer iron for delivery the second half of next year by the United States Steel Corporation, and it will be some time before additional Bessemer iron is purchased by the corporation unless lower prices prevail.

The rail tonnage placed with the mills during the past few days was very heavy, the Union Pacific having closed a contract for approximately 60,000 tons. The same road also placed an order for 40,000 tons aboard to be shipped via steamer to the Pacific coast. The deliveries on these rails are also somewhat better than the American mills could promise, while the freight rate also figured in the transaction to some extent. The rails that will be delivered on the coast will be used on the extreme Western end of the road while the rails from the American mills will be used along the remainder of the line. The Canadian pacific is at present negotiating for the purchase of 50,000 tons of rails for delivery next year with foreign manufacturers. Owing to the fact that the rails can be delivered into Canada, duty free, this road has always purchased its rails abroad. It is probable, however, that within the next year the contracts for the rails for this road will be placed with Canadian mills.

There has been considerable heavy buying of structural material for delivery next year by fabricators who are already closing contracts for building operations in 1903. Contracts for fully 20,000 tons of structural material have been placed for delivery through the first half of next year at the agreement price ruling on these future deliveries.

The foreign steel market has declined sharply and German billets are now offered for early delivery at $30, Pittsburg. Domestic steel is also somewhat lower, Ohio mills offering Bessemer billets at $32 delivered in the Pittsburg district during the next three months while open-hearth billets can be secured at $33 for the same delivery. Despite these lower quotations there is little buying, consumers holding off for still better prices.

Eastern furnaces have this week made offers of $2.75 per ton for non-Connellsville furnace coke for deliveries extending

through the first half of next year, but as yet no contracts have been accepted by the coke producers. On this basis the price for Connellsville furnace coke would be $3 per ton for equal delivery. Should additional offers be made by furnaces it is probable that a price will be established by the coke producers for next year's deliveries at an early date.

PIG IRON.—Contrary to expectations, the buying of foundry iron for delivery next year continues heavy, about 22,000 tons having been contracted for during the past week. The two large Southern producers have notified the trade that they cannot accept any more orders for the softer irons while a number of Northern furnaces are also out of the market to July 1, 1903. No. 2 foundry for prompt delivery is held at $24 per ton, while for delivery the first half of next year prices range from $21.75 to $22.15. Forge iron for prompt delivery is held at extremely high prices, furnaces asking from $22.50 to $23. Considerable basic iron is now being offered in this market for delivery the last three months of this year and the first quarter of next year by both Northern and Virginia furnaces, but as yet practically none has been purchased. Large tonnages of Virginia basic for delivery the last quarter of this year are being offered at $18.75 at the furnace equal to about $21.30, delivered, Pittsburg, while for delivery the first quarter of next year 25 cents per ton less is asked. A small lot of Virginia basic for prompt delivery is being offered here at $21.50, but the price is evidently considered too high by consumers, as it has not yet been taken. There have been no transactions in Bessemer iron of late and the United States Steel Corporation has not yet asked for a price on Bessemer for delivery the second quarter of next year. For delivery the last quarter of this year furnaces are quoting $21.50 to $21.75, Pittsburg. We revise quotations as follows:

Bessemer, Valley	$21 00 to 21 75
Bessemer, Pittsburg	21 75 to 22 50
No. 1 Foundry	24 50 to 25 00
No. 2 Foundry	23 00 to 24 00
No. 3 Foundry	21 75 to 22 25
Gray Forge, Pittsburg	22 50 to 23 00
Chilled Basic, Valley	20 75 to 21 00
Chilled Basic, Pittsburg	21 50 to 21 75

STEEL.—The foreign steel market is much easier than it has been for some time and German billets can be delivered here at $30 per ton. It is probable that there will be further declines in the market as the German steel market is much weaker at present than for several months. Domestic mills are also quoting both Bessemer and open-hearth billets at somewhat lower prices, a considerable tonnage of Bessemer billets being offered here at $32 per ton while open-hearth billets can be procured for $33. Bessemer rods continue scarce at $36 to $37.

FERRO-MANGANESE.—The market continues extremely quiet, no transactions having been reported. German ferro is held at $52 and English at $52.50. Domestic, 80 percent, is held at nominally the same price as the English.

SPELTER.—The market continues extremely firm and little spelter for spot shipment is to be had at the present time. For delivery next month Prime Western grades are held at 5.32½c to 5.35c, Pittsburg.

SKELP.—The market continues very quiet and there is little demand for either iron or steel. Both grooved and sheared iron skelp is held at 2.10c to 2.15c and steel at 2.25c.

MUCK BAR.—We note sales of muck iron aggregating 7,000 tons at prices ranging from $35 to $36 for delivery within the next four months.

RAILS AND TRACK MATERIAL.—The Union Pacific Railroad has placed a contract with foreign rail producers for approximately 40,000 tons of rails for delivery next year while an order by the same road for 60,000 tons for the same delivery was placed with domestic mills. Contracts placed with the American mills during the past week aggregate nearly 100,000 tons. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32! light rails, 8 pounds, $46; 12 pounds, $44; 16 pounds, $42; 20 pounds, $40; 25 to 40 pounds, $38 to $40. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

BARS.—The market has been somewhat quieter during the past week although the lull is appreciated by the mills that are months behind on their deliveries. A number of the bar mills in this district are still shut down on account of the scarcity of steel. Our quotations are as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c to 1.90c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2.25c and upwards.

PLATES.—The market continues very strong and mills have little difficulty in securing from $5 to $8 premium for early deliveries. The heavy business placed in structural material in the past week carries with it a considerable tonnage of plates, which is, however, for delivery next year. Agreement quotations are as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches wide, 5c extra 100 pounds. Plate 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

PIPES AND TUBES.—There is a good demand for heavy pipe for early shipment to points in the west while the demand for merchant pipe continues strong despite the fact that this is usually the dull season in the trade. Quotations to jobbers in carload lots, with freight added to destination, are as follows:

MERCHANT PIPE.

	Black Percent.	Galv. Percent.
⅛ to ½ and 11 to 12 inches	60	48
¾ to 12 inches	67	55

Discount to consumers in carload lots, Pittsburg, are as follows:

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¼ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	42½
2¼ to 5 inches	50
1¼ to 2¼ and 6 to 13 inches	40

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—Early deliveries are promised by some mills on the heavier gauges and 2.15c is asked for No. 8 while 2.25c is quoted for No. 10 in carload lots. Our quotations on black sheets in small lots from jobbers are as follows: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots to consumers are as follows: Nos. 10 and 11, 3.05c; Nos. 12 to 14, 3.15c; Nos. 15 to 17, 3.25c; Nos. 18 to 21, 3.45c; Nos. 22 to 24, 3.75c; Nos. 25 and 26, 4c; No. 27, 4.25c; No. 28, 4.50c.

WIRE AND WIRE NAILS.—The market continues quiet in both wire and wire nails although there is a strong demand for cut nails. Quotations are unchanged, however, as follows: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than car load lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—At a meeting of the cold rolled strip steel manufacturers held here last week one of the large local manufacturers severed connections with the organization. No change in prices was announced however. Our quotations are as follows: Turned, cold rolled ground shafting in carload lots 47 off, and in less than carload lots, 42 off; tire steel, 2.25c to 2.30c; toe calk, 2.35c to 2.45c; sleigh shoes, 2.25c to 2.35c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The market continues quiet and sales are almost entirely limited to small lots. We note the sale of 500 tons of low phosphorus melting stock at $24.50 per gross ton. Our quotations, gross tons are as follows: Cast scrap, $18 to $19; heavy melting stock, $21 to $21.50; No. 1 wrought scrap, $22 to $22.25; steel rails for rerolling purposes, $23; car wheels, $21.25 to $21.50.

COKE.—Furnace coke for prompt delivery continues to command from $3.50 to $3.75 at the ovens and many producers are unable to make prompt deliveries at these prices. Furnaces that are short of coke at present are beginning to make offers for coke for delivery the first half of next year and as high as $2.75 has been offered on large contracts, but has not yet been accepted. As these offers have been made for outside coke, the Connellsville product should command $3 on the same basis. For the week ending Saturday, Aug. 2, the estimated production of the Connellsville region amounted to 250,238 tons a slight gain over the production of the previous week. During the same period the lower region produced 42,214 tons, a gain of nearly 5,000 tons over the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
934 MONADNOCK BLOCK, August 12.

In general little change is apparent in the condition of this market from that reported a week ago. Sales of pig iron continue to be quite active, and were it not for the unusual conditions at present existing, the anxiety of foundrymen to get their contracts placed would be a matter for special comment. The bulk of the business closed in the past week has come from melters of the smaller class, whose wants at a time rarely exceed 500 to 1,000 tons; and so heavily have these bought in the last two weeks that a number of furnaces have been compelled to withdraw from the market and others to advance their prices on certain grades.

Bar iron has strengthened considerably as a result of the favorable crop outlook, and 1.90c is now the lowest price at which material can be bought, and 1.95c on carload orders. Reports from the West say it is almost impossible for the corn crop to suffer in any appreciable degree, and so flattering are these reports that manufacturers of bar iron are quite confident that this product will advance to two cents in a few months. Some are already refusing to sell iron at less than 1.95c, whatever the size of the order may be. Structural steel has been active during the week, contracts aggregating between 20,000 and 30,000 tons having been closed. In other lines of finished material, the market has been quiet, manufacturers of merchant steel, plates, rails and track supplies, sheets, pipe, etc., being sold up for periods varying from six to twelve months, and not seeking new business. Coke is still very scarce, and commands $6.50 for spot delivery. Old material, with the exception of cast scrap, is weak, and prices are 25 to 50 cents lower than a week ago. Such sales that are made are generally forced, mills having a large stock on hand and not buying anything, except of a special nature.

PIG IRON.—The number of furnaces already withdrawn from the market for the first half of next year has been increased in the past week by the addition of a large Southern producer, which announces that it has no more No. 2 foundry or No. 2 soft to offer for this period at present. This same company has also advanced the price of No. 1 soft and No. 1 foundry $1 a ton, and has instructed its salesmen to sell not more than 100 tons of these grades to any one customer, and that all such sales are subject to approval of furnace. More furnaces are expected to withdraw in the near future, and an advance for all grades of iron is expected. Lake Superior charcoal iron has advanced $1 a ton in the last week, and an advance is shortly expected in high silicon iron. There has been a heavy demand for the latter in the past ten days and it is estimated about 20,000 tons has been sold in this period. Several hundred tons of spot iron were sold during the week at $26.50 a ton, Chicago, with an inquiry for many times this amount. Trading in future deliveries has been heavy, the demand including all grades, though that for foundry irons was the heaviest. Contracts have averaged from 500 to 1,000 tons, with a few for larger amounts, notably one for 15,000 tons. We have revised our quotations for future delivery as follows:

Lake Superior Charcoal	$27 00 to 28 00
Local Coke Foundry No. 1	23 50 to 24 00
Local Coke Foundry No. 2	22 75 to 23 25
Local Coke Foundry No. 3	22 25 to 20 75
Local Scotch Foundry No. 1	22 00 to 23 00
Local Scotch Foundry No. 2	21 50 to 22 50
Southern Coke No. 1	22 40 to 23 40
Southern Coke No. 2	20 65 to 21 65
Southern Coke No. 3	20 15 to 22 15
Southern Coke No. 4	19 65 to 20 65
Southern No. 1, soft	22 15 to 23 15
Southern No. 2, soft	20 65 to 21 65
Southern Gray Forge	19 65 to 20 65
Southern Silveries	22 15 to 23 15
Jackson Co. Silveries	27 00 to 28 00
Ohio Strong Softeners	24 10 to 24 60
Alabama Car Wheel	26 00 to 26 50
Malleable Bessemer	22 00 to 23 00

BARS.—Considerable business has come in during the week just closed, this having been one of the heaviest weeks of the summer for manufacturers. In consequence the price of iron has stiffened materially and 1.90c is the lowest quotation that will be made on any order. Some mills which a week ago were willing to accept favorable contracts at 1.80c are now refusing to quote less than 1.95c. There is no general buying movement, orders coming from all classes of consumers. We quote Chicago delivery, Bessemer steel, 1.75c to 1.85c; angles, less than 3x3, 1.85c; iron, 1.90c to 1.95c; hoops, 2.05c. Prices out of store, steel, 2c to 2.10c; iron, 2.20c to 2.25c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

SHEETS.—There is no lack of business offered, the trouble of consumers and mills being to get and to give satisfactory delivery. All the mills are sold up months ahead, and consumers needing the material promptly find it necessary to go to jobbers for the same. Store trade has been active in the past week. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.45c; out of store, No. 27 black, 3.35c to 3.50c; galvanized, 4.60c to 4.75c.

STRUCTURAL MATERIAL.—Local sellers report that sales of structural material during the week aggregated between 20,000 and 30,000 tons. There is some inquiry for foreign material for prompt delivery, though no sales are reported in the last few days. Manufacturers are still able to give delivery on heavy sizes within the first quarter of next year, though on lighter material are literally "snowed under" with orders. We quote mill prices, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c. Prices on lots from store are based on the necessities of buyers and according to the size of order. Store prices vary from 2½ to 4 cents a pound.

BILLETS.—Several hundred tons of foreign-made forging billets were sold in this city a few days ago, delivered in Chicago at $36 a ton. Open-hearth billets of foreign make are quoted at $31, Chicago.

RAILS AND TRACK SUPPLIES.—The buying of light rails has been very active of late, several thousand tons having been sold in the last week. A few deals are still pending for standard sections, and some orders have been taken during the week. The local mill has its capacity on heavy rails taken as far as August, and most of the business now being closed here for this material goes to eastern mills. Track supplies are in good demand. We quote heavy sections, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2.25c; spikes, carload lots, 2.45c to 2.55c; track bolts 3½x¾, with square nuts, 3.05c per 100 pounds; with hexagon nuts, 3.20c with usual differentials for other sizes.

MERCHANT STEEL.—Manufacturers of this material being out of the market for the balance of this year, new business is not sought after. There is, notwithstanding, considerable inquiry. Store trade is active as a result of the condition of mills. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.65c to 2.75c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 percent to 10 percent higher; cold rolled shafting, carload lots, 50 percent off, Chicago; less than carload lots, 45 percent off, Chicago.

CAST IRON PIPE.—The local interest closed an order for 4,600

tons of pipe with the municipality of Elyria, O., and received a large number of smaller orders from others sources during the week. We quote 4-inch water pipe, Chicago delivery, $35.75; 6-inch and larger, $33.75 to $34; gas pipe, $1.00 a ton higher.

MERCHANT PIPE.—Though specifications are plentiful, new business is not active, which is not unusual for this period of the year. Prices are as follows:

MERCHANT PIPE, RANDOM LENGTHS.

(Jobbers, Chicago Basing Discounts.)

	Black Percent.	Galv. Percent.
⅛ to ½ in. inclusive	58½	46½
¾ to 12 in. inclusive	65½	53½

(Consumers, Chicago Basing Discounts.)

⅛ to ½ in. inclusive	56½	43½
¾ to 12 in. inclusive	63½	50½

BOILER TUBES.

Steel.

	Percent.
1 to 1½ in.	35
1¼ to 2½ in.	45
2¾ to 5 in.	55
6 to 13 in.	47½

Iron.

	Percent.
1 to 1½ in.	35
1¼ to 2½ in.	32½
2¾ to 5 in.	42½

PLATES.—The local interest has its capacity taken for the balance of this year, and is refusing orders for delivery in 1903. Eastern mills report that business is good and that their output for the first quarter of next year is taken. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c to 2.15c; flange steel, ¼-inch and heavier, 1.85c to 2.25c; from stock, tank steel, ¼-inch and heavier, 2.30c to 2.50c; 3-16, 2.40c to 2.60c; No. 8, 2.45c to 2.65c; flange steel, 2.50c to 2.60c.

WIRE AND WIRE NAILS.—Mills are having a rather dull month, which is not unusual for this time of the year, nor unwelcome since it gives them an opportunity to catch up on delayed orders and accumulate stock for the fall trade. Business from the manufacturing trade, such as mattress makers, etc., is extremely heavy, though from the agricultural districts it is correspondingly low, most of the farmers having been delayed on account of the rains in harvesting their crops. Prices to jobbers are as follows: Smooth wire, carload lots, $2.10; painted barb wire, $2.70; galvanized barb wire, $3.00; wire nails, $2.15; staples, $2.25. Retailers' prices, 5 cents higher than these.

COKE.—The stock of coke in the West is represented as being very low, and both foundrymen and furnacemen are concerned over the outlook. Coke for spot delivery is now held at $6.50 a ton. For future delivery, we quote 72-hour Connellsville foundry, $5.75 to $6.00; Virginia and West Virginia, $5.50 to $5.75.

OLD MATERIAL.—Transactions during the week have been few in number, and such sales as were made were for special lots. All the mills have large stocks on hand, and deliveries on their contracts provide them more than enough material. Cast scrap of all kinds is in heavy demand and the price is stiff. We have reduced a number of our quotations in view of the weakness explained above.

Old iron rails	$24 00 to 24 50
Old steel rails, long lengths	22 50 to 23 00
Old steel rails, short lengths	18 00 to 19 00
Relaying rails	31 00 to 32 00
Old wheels	20 00 to 21 00
Heavy melting steel	17 25 to 17 50
Mixed country steel	14 50 to 15 00

The following are selling prices per net ton:

No. 1 R. F. wrought	$20 00 to 20 50
No. 2 R. F. wrought	18 50 to 19 00
Dealers' forge	15 50 to 16 00
No. 1 busheling	13 50 to 14 00
No. 1 R. R. and Machine Cast	14 50 to 15 00
Railway malleable	15 50 to 16 50
Country malleable	14 00 to 14 50
Iron axles	24 00 to 24 50
Steel axles	20 50 to 21 00
Cast borings	9 50 to 10 00
Wrought turnings	13 50 to 14 00
Iron axle turnings	14 00 to 14 10
Steel axle turnings	13 50 to 14 50
Stove plates	11 00 to 11 50
Old iron splice bars	20 50 to 21 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Aug. 13.

There was a time when the sale of the Republic mine to a company which would take the entire product for its own use would have been an event of great importance to the ore market, because for a number of years the price paid for Republic ore fixed the general market price. But conditions have changed and the sale to the Cambria Steel Co., which was consummated Tuesday, was of significance chiefly as recalling the very interesting history of the mine rather than as likely to have much influence on the ore situation. Shipments for the first week of August from Lake Superior mines were about as heavy as for the preceding week, and the outlook is that the total for this month will be as large as that for record-breaking July.

PIG IRON.—The market for foundry iron continues firm with many inquiries for next year. Sales are not made with a rush, and there were no large ones during the week, but a good, steady business is being done. We quote prices as follows, the lower figures on foundry iron being for shipment in the first half of 1903 and the higher figures for deliveries in the first two or three months of the new year:

Bessemer	$21 75 to 22 25
No. 1 Strong Foundry	22 25 to 22 75
No. 2 Strong Foundry	21 75 to 22 25
No. 3 Foundry	21 25 to 21 75
Scotch No. 1	22 25 to 22 75
Scotch No. 2	21 75 to 22 75
Gray forge, Valley	20 00 to 20 50
Lake Superior Charcoal	24 00 to 26 00

FINISHED MATERIAL.—There was not a ripple during the week to disturb the placid waters of prosperity. Shipbuilders and manufacturers of agricultural implements have now about covered for the year, and the latter up to the middle of 1903 in some cases. Prices of tank steel still range from 1.70c to 1.85c, Cleveland, according to sellers and deliveries. The base price for bar iron is maintained at 1.80c, Pittsburg, and the market is firm in spite of the fact that the high price has encouraged the use of steel. Sales out of store, Cleveland, are on a basis of 1.90c to 2c for iron and steel. It is daily becoming more apparent that the mills will fall considerably short of being able to fill their contracts made for this year. We quote steel bars at 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg. Weakness of sheets still continues and the perusal of the list of new sheet mills being constructed as published by this paper has caused considerable discussion as to what will happen to the market when the new mills are all going. We quote 2.10c to 2.15c Cleveland for 3-16-inch and heavier. Cleveland prices are on the following basis on mill sales of black sheets: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. On galvanized sheets Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.53c; No. 28, 4.60c. We continue to quote 1.70c Cleveland for beams and channels for delivery in 1903, business for 1902 being through jobbers at prices from 2½ to 3½c according to sizes and quantity.

OLD MATERIAL.—The recent change of policy of the Erie railroad in mailing to dealers an elaborate inquiry blank instead of following the usual plan of the railroads in sending out statements of the amount of old material for sale has caused much comment. While some dealers are not pleased, the hope is expressed that the new plan, if generally adopted, will check speculation, which is considered the bane of the scrap market. The Erie company asks the dealer not only to tell what old material he wants but also requires that the name of the consignee be given. The market remains firm at the following Cleveland prices, all for gross tons:

Old iron rails	$26 00 to 27 00
Old steel rails (6 ft. and over)	22 00 to 23 00
Old steel rails (6 ft. and under)	20 00 to 21 00
Old car wheels	19 50 to 20 00
No. 1 R. R. wrought scrap	22 00 to 23 00
Mill scrap	20 00 to 20 50
No. 1 machine cast scrap	18 00 to 19 00
Iron axles	28 00 to 29 00
Axle turnings	18 00 to 18 50
Wrought turnings (free from cast)	15 50 to 16 00
Cast borings	11 00 to 11 50
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	18 00 to 19 00
Grate bars	11 50 to 12 50
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	11 50 to 12 00
Wrought drillings	14 50 to 15 00
Malleable iron	18 50 to 19 50
Stove plate	13 00 to 14 00
Heavy steel	19 00 to 20 00

CINCINNATI.

August 12.

The summer vacation period has seemingly had no effect on the iron trade in any of its branches. The demand for pig iron has kept right up both for delivery as quickly as possible and for delivery during the first half of 1903. The demand for all kinds of finished material has shown no signs of letting up whatever, and the orders have been pouring in without cessation. Even in the scrap market, that has been rather quiet in times previous, there has been noticed a continued absorption of everything offered.

This unending activity in the iron trade, coming as it does with advances in prices, is the best possible indication for operators in all departments of the trade, that prosperity is bound to remain within the country for a time longer. The purchasers of the finished product are the ones that keep the furnaces rushed to the limit. Machine tool men, manufacturers of all kinds of articles in which iron and steel enter and the buyers of castings for all uses are rushed in their own business to such an extent that they are trying in every way to get caught up. The supply of building material is entirely inadequate to the demand, and out of proportion to the supply of other products. This makes the foundrymen and the mill men strain every nerve to get the material out as nearly on time as possible. And they in their turn fall back on the furnaces and seek to hurry up deliveries of pig iron that are delayed by labor troubles, scarcity of coke and various other causes. Taken altogether, iron men in whatever line have had little time to enjoy a vacation this summer.

Pig Iron.—The buying of pig iron continues to be of two kinds; first, for as early delivery as possible, and second for delivery during next year. In the first instance the only iron that is available is such as can be furnished by furnaces having a few small odd lots. In the second the buying has already gone ahead to such an extent that some of the large producing concerns in the South are unable to sell any more iron calling for delivery during January, February and March. This is unusual at this time of the year. The fall buying has begun much sooner than is ordinarily the case. It is due probably to the desire of foundrymen and mills to cover their needs as soon as possible in view of the uncertainty existing on account of labor troubles, short supply of ore and fuel and the general heavy demand. As for the labor troubles the situation is no different from what it was in the South. In respect of supply of fuel and ore the situation is somewhat relieved in spots, but by no means satisfactory. As for the demand, it is unprecedented. Many of the furnaces will be unable to make deliveries of iron as promised, and it is likely that iron made in 1903 will have to be delivered on 1902 contracts. This will cut in considerably on the 1903 business.

During the past week there has been a good demand for all grades of iron. Foundry, malleable and charcoal iron being eagerly sought for, while there has been some business in basic as well. Sales aggregating between 60,000 and 75,000 tons of Southern irons have been made by Cincinnati agents during the past week. Most of this iron is foundry iron for delivery during March, April and May. There has been a little foreign iron brought in from abroad by Cincinnati people though it has not come very far west. Central New York, which can be easily reached by the canal, is about as far west as any considerable amount of iron has been brought. The situation in the Pocahontas district is reported to be a little better, the mines getting out about 20 percent more coal than they did a couple of weeks ago. This is better for the furnaces that rely on coal and coke from that district, though some of the furnaces are operating their own shifts of men at the mines in order to get out fuel for their own use. Prices remain as follows:

Southern Foundry No. 1	$20 25 to 21 75
Southern Foundry No. 2	19 75 to 21 25
Southern Foundry No. 3	19 25 to 20 75
Southern Foundry No. 4	18 75 to 20 25
Southern Foundry No. 1, soft	20 25 to 21 75
Southern Foundry No. 2, soft	19 75 to 20 75
Gray Forge	19 00 to 20 00
Northern Foundry No. 1	25 10 to 26 60
Northern Foundry No. 2	24 10 to 26 10
Southern C. W. iron	25 25 to 25 75
Malleable coke iron	22 75 to 23 50

Spot iron is all the way from $1 to $3 higher.

Finished Material.—There is little to say about the market for finished material. It is remarkably unchanged, both as to be continued heavy demand and the steadiness of prices. Deliveries are as unsatisfactory as ever from the standpoint of the consumer and although there is some talk of increased capacity the situation is none improved. Prices remain unchanged, bar iron being quoted at 1.92c and steel bars at 1.72c, both being quoted at 2.20c out of store. Angles are 2.35c and 2.50c out of store. Sheets are quoted at 2.50c for No. 12 and 2.35c for No. 10.

Old Material.—All the available supply of old material, and this is not great, is being taken up in lieu of pig iron by many melters. Prices are probably as high as they will be unless there is a scarcity of pig iron beyond what is expected. Corrected to date they are as follows:

Old No. 1 Wrought Railroad, net tons	$20 75 to 21 25
Cast Machine and Foundry, net tons	14 75 to 15 75
Old Iron Rails, gross tons	25 00 to 26 00
Old Steel Rails, gross tons	24 00 to 25 00
Old Short Lengths, gross tons	17 75 to 18 25
Old Iron Axles, gross tons	27 00 to 28 00
Old Iron Car Wheels, gross tons	19 50 to 21 00
Stove Plates, gross tons	11 75 to 12 00
Wrought Turnings, net tons	14 50 to 15 50
Cast Borings, net tons	9 50 to 9 75

NEW YORK.

Office of *The Iron Trade Review*,
Room 1909, No. 150 Nassau St., August 12.

Pig Iron.—During the past week the tendency to await developments in the pig iron market seems to have taken upon itself additional force, so far as buying for 1903 was concerned. The retirement of one large Southern producer from the selling arena for the first six months of next year has added to the confusion of consumers who have been unable to decide upon a plan of action for that period. These remarks particularly apply to the higher grades of foundry iron, as little or no attention is being given to the lower grades. There has been no let-up in inquiries for material for next year's delivery. Even Pennsylvania furnaces, which manifest a disinclination to book any orders for 1903, are compelled to enter some, particularly from steady customers. Private advices from Birmingham give unmistakable evidences of higher prices. One of the largest Southern producers which opened its books for next year on the basis of $16.50 for No. 2 foundry at Birmingham, which later advanced its price to $17, is now refusing to take any orders less than $17.50, and is disposing of so much tonnage at this price that it will either raise its price to $18, or announce its retirement from the market soon for the first six months of the year. The company in question cannot promise shipments earlier than March. Other furnaces are reported as selling their output on the basis of $18 at Birmingham for No. 2 foundry, and the opinion seems to be pretty well grounded that this will be the minimum figure before long. In Northern irons, No. 2 seems to be most in demand, and the prevailing price at the furnace is $21.50 for delivery next year, although $23 is asked for special grades. Spot iron is commanding some fancy prices, and re-sales are being made. One of the latter was made on the basis of $25 for No. 1 foundry at Birmingham, and $24 for No. 2 foundry at Birmingham. In both cases the tonnage was small, and the shipment most urgent, which accounts for the high price paid. Foreign irons are in good request, and for good brands, especially of Scotch make, prices average from $23 to $25, with inquiries from far Western points an interesting and unusual feature. New York prices, summer delivery, are about as follows: No. 1 X Northern, $23.50 to $25; No. 2 X Northern, $22.75 to $23.50; No. 2 Northern plain, $22.25 to $22.50; No. 1 foundry Southern, $22 to $23; No. 2 foundry Southern, $21.75 to $22.50; No. 3 foundry Southern, $21.25 to $22.75; No. 4 foundry, $20.25 to $21.25.

Finished Iron.—Activity in all branches of the structural material trade is heard on all sides. Mill deliveries are reported to be better now than for some weeks past. The explanation given for it is that the mills have stopped giving attention to special sizes, and are now being operated with the view to meeting requirements on all sizes. Foreign material is still reaching seaboard points in fairly large quantities, especially from Germany. In sheared steel plates the mills are making special efforts to keep up with the demand, but the latter continues so strong that not much progress is made, and spot sales as a consequence are getting more numerous, with good premiums the rule. The steel sheet market

has disappointing features, and sales below current prices are common, particularly among small jobbers. In bars the demand is being fully maintained, and prices are strong. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.95c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; fire box, 2.30c to 3.50c; refined iron bars, 1.95c to 2c; soft steel bars, 1.95c to 2.10c; steel sheets, in carloads, New York; No. 28, black, 3.18c to 3.25c; No. 28, galvanized, 70, 10 and 5 off.

PHILADELPHIA.

Aug. 12.

Business is being conducted in large volume, but the situation is not free from perplexities. The fixing of iron at prevailing high prices has caused many buyers to hesitate and they are looking across the ocean for relief. The difficulty is not in regard to anticipated scarcity of business, but concerning the establishment of a safe basis of prices. Temporarily, the high prices must be paid, but whether it is safe to contract for a year in advance is a matter of doubt. There are indications that by the end of the month the situation will be more settled.

PIG IRON.—The market is very strong for spot and for almost all deliveries for this year. There is also considerable demand for the first half of 1903. Prices of No. 2 X foundry range from $21.75 to $22.50 for the first half of the year, or for the entire year, $21.50 to $22. For this year's delivery it is difficult to get good American iron at any prices. Foreign iron is being widely distributed, no very large lots, but carload lots up to 100 or 200 tons are taken quite freely. Prices vary, according to quantity, point of delivery, character of iron, etc., but $20.50 to $21.50 is about the range for Middleboro irons, although 1,000-ton lots and upward for September shipment could be done at somewhere around $19.50, ex ship. Scotch irons, which are regarded more favorably, command $23.50 to $24 for prompt delivery in consumer's yards, or about $23 alongside vessel. Prices may be quoted about as follows:

For city and nearby deliveries during 1903, and from $1 to $1.50 more for this year's deliveries, the premium being mostly on foundry grades: No. 1 X foundry, $23.50 to $24.50; No. 2 X foundry, $22 to $22.50; No. 2 plain, $21 to $22; standard gray forge, $20.50 to $21; basic, $20.50 to $21; low phosphorus, $23 to $23.50; No. 3 Middlesboro, $21 to $22; Scotch irons, $22.50 to $23.50, the latter three for prompt shipments or spot.

BILLETS.—Demand is not heavy and prices are easier. Foreign can be bought for $28.50.

FINISHED MATERIAL.—There is no change worth mentioning. Business is good and mills well employed at unchanged prices. Except plates, deliveries can be had with a fair degree of promptness.

OLD MATERIAL.—Steel is firm, but prices are about as they were. On the whole, the demand is fair, but supplies are in good volume. Old steel rails, $21.50 to 22.00; miscellaneous heavy steel scrap, $20.50 to $21.25; low phosphorus scrap, $27.50 to $28.25; old steel axles, $27.50 to $28; old iron axles, $31 to $31.50; old iron rails, $25 to $26; old car wheels, $20.50 to $21; choice scrap railroad No. 1 wrought, $23 to $24; country scrap, $18.50 to $19.50; machinery cast, $18 to $19; No. 2 light scrap, forge, $17 to $18; No. 2 light scrap, ordinary, $15 to $16; wrought turings, $16.75 to $17.50; wrought turnings, choice heavy, $18 to $19; cast borings, $10.50 to $11; stove plate, $13.75 to $14.25.

The sheet workers employed at the plant of the Ashland Sheet Steel Co., Ashland, Ky., affiliated with the Amalgamated Association, have gone on a strike for recognition of their union. Some time ago the men were notified that the company would not sign the scale for the fiscal year, but that the wages prescribed in the scale would be paid, notwithstanding. The association is conducting other strikes at Reading, Pa., Terre Haute, Ind., and New Haven, Conn.

The Rosena furnace of the National Steel Co., located at New Castle, Pa., has been shut down for much needed repairs. Part of the stack will be taken down and the furnace capacity will be materially increased by enlarging the stack.

CENTRAL FOUNDRY CO.'S REPORT.

The annual report of the Central Foundry Co., which manufactures soil pipe and plumbers' cast iron goods, shows that there are no earnings available for dividends. An allowance of less than $40,000 is made for depreciation of plants inventoried at $15,931,182. President Fowle says that when the company's furnaces and mines are in full operation the receipts will be largely increased. Results for the fiscal year ending June 30, 1902, are:

Earnings on sales after deducting all operating charges		$378,054 86
Bond interest for 12 months ending June 30, 1902	$231,780 00	
Debit balance to profit and loss carried from July 1, 1901	57,116 35	
One-fourth of organization expense, three-fourths having been previously charged off	9,068 00	
Expense of replacement and betterment of equipment	40,271 88	
Depreciation of plants	39,818 53	
		$378,054 86

The general balance sheet shows:

Assets:		
Plant investment	$15,971,001 00	
Less depreciation of plants	39,818 00	
		$15,931,183 00
Treasury stock		700,000 00
Central Iron & Coal Co. investment		327,275 00
Accounts and bills receivable	$527,194 00	
Less freight allowances and cash discounts, estimated	12,000 00	
		515,194 00
Inventory		362,139 00
Cash		100,687 00
Unexpired insurance		6,338 00
Furniture and fixtures		4,772 00
Total		$17,947,588 00
Liabilities:		
Capital stock		$14,000,000 00
Debenture bonds		3,863,000 00
Accrued bond interest		38,630 00
Accounts payable, not due		44,816 00
Taxes and licenses		1,142 00
Total		$17,947,588 00

Structural Iron Workers' Strike.

(Special Telegram.)

PITTSBURG, Pa., Aug. 13.—The structural iron workers in the employ of the American Bridge Co., engaged on work in this district, have received orders from their organization to discontinue work tonight until further orders. Fully 1,000 men are employed by the American Bridge Co. in this district and the strike order will result in tying up a large amount of work, not only on buildings but on blast furnaces and new steel works construction as well. The order was issued on account of the refusal of the American Bridge Co. to pay the scale of wages demanded by the Structural Iron Workers' organization, in Philadelphia and immediate vicinity, and the sympathetic strike was ordered. It is probable that this order will be extended so that all the men affiliated with the structural iron workers and employed by the American Bridge Co. all over the country will be called out on strike. The union rate calls for 50 cents per hour, while in Philadelphia and adjacent territory only 47½ cents per hour has been paid.

The Washington Coal & Coke Co., of Pittsburg, with works located at Dawson, Pa., has decided to erect 40 additional coke ovens immediately. Work has already been commenced on the foundations and they will probably be lighted within the next two or three months.

The Hazard Mfg. Co., of Wilkesbarre, Pa., manufacturers of wire rope, copper and insulated wire and cables, represented by N. P. Hyndman, at Pittsburg, Pa., has appointed Fred North as the latter's assistant. A new office has been established at Room 21, Conestoga Building.

Work on the erection of the new plant of the Clearfield Iron & Steel Co., Clearfield, Pa., was commenced this week. It is probable that the plant will be completed shortly after the first of next year.

September 1. is the date now positively set for making first castings in the immense foundry of the Allis-Chalmers Co. at West Allis.

THE IRON TRADE REVIEW

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HOME PRICES AND EXPORT PRICES IN IRON AND STEEL.

The agitators for a reduction or abolition of the tariff on certain iron and steel products say things that remind one strongly of the way free traders used to talk. Though they claim to be protectionists these who lately have been calling for tariff revision—and we will not say that tariff revision is never in order—are life free traders in this particular at least: they are very long on theory and equally short on facts. They are much exercised because some of the products of American steel mills have been sold abroad at lower prices than home consumers pay to the self-same producers. Here, for example is a paragraph from a protest by the *Independent*, usually sound and accurate, referring to Chairman Babcock's conclusion that after all the low priced sales of steel abroad are not as reprehensible as he once thought and that they are even to be defended because they "keep the mills running:"

> It was to "keep the mills running" that Mr. John W. Gates, now more widely known that he was at that time, a few years ago sold American steel rails abroad at about $17 a ton, the uniform or combination price here then being, we think, $28. He was president of a large Western steel company that is now a part of the great steel corporation. After a record of the sale had been with some difficulty obtained, he was urged to make explanation. He published a statement that he had sold the rails at so low a price to "keep the mills running." When he was reminded that American buyers would have jumped at the chance to take rails at $17, and that sales to them would also have kept the mills running, he was mute, so far at least as any expression of his views for publication was concerned. The truth was that this company—as a member of the Steel Rail Association, which still exists and determines the price of rails—was bound not to sell in this country below the combination price.

The writer of the above is not familiar with the war of 1897 in the steel rail trade. The $17 rails to which he refers were sold in February of that year, to the extent of over 1,000,000 tons, not to foreign railroads, but to railroads at home. The Steel Rail Association had indeed fixed a price late in 1896—not $26, but $25. But the agreement was broken, and for two weeks in February there ruled such a war of prices as must have delighted any economist in slippers and gown who finds pleasure in the annihilation of the profits of home industry. But there was another accompaniment of the steel rail war of February, 1897, which these theorists prefer to ignore in dealing with the effect of low priced products. It was followed almost immediately by a 10 percent reduction of wages in the mills of the steel companies that in the headlong scramble for business had given American railroads the $17 price that previously had been made on the fraction of our rail output marketed abroad "to keep the mills running." The American people got the lowest price ever made on steel rails in this or any other country, and they got what must inevitably accompany such prices—a reduction in wages. The cry of the agitator for tariff reform was answered, but the wage-earners paid the price.

Now, there could be more of this sort of thing if the American people were willing to pay the price. But just as the $17 rail price in 1897 was the badge of the American steel trade's extremity, so will the prevalence at home of the level of prices made on an exported fractional surplus be always an index of industrial distress and of low wages.

But why this exhibition of indignation over low-priced steel exports just now? Why is this question agitated at a time when exports of American iron and steel are conspicuous by their absence? Who are these foreign buyers of American steel products who are getting concessions that are denied home consumers? In June we sent abroad less than 30,000 tons of pig iron, steel, and rolled products, while our home consumption in the same months was probably 1,500,000 tons of pig iron, steel and finished products, or 50 times as much. Shall our home price be governed by the 98 percent or by the 2 percent?

But when the time of slackening home demand comes, what will those prefer, who clamor for the export level of prices at home? Would they have no effort made to increase the foreign business, that our mills may be kept going? Or would they have mills closed here and there, and production limited to the diminished home demand? Or would they have 1897 repeated, and prices to home consumers cut to the export level and wages cut at the same time?

It is largely a matter of paying the price. If, as we are told, "the American people can never be induced to regard with complacency and favor the sale abroad of the products of their protected industries at prices much lower than those which they themselves are required to pay for them," will they then elect to have all that goes with the sale of the full home product in a given line at this surplus slaughter price?

The question is a very practical one and not one of theories and maxims. The theory of a home price no higher than that of the lowest sale abroad may appeal strongly to some minds; but it is as far off from good practice, as the free trade theory that the tariff is always added to the foreign price of a product has been far from the truth.

The iron trade of the United States was starving its way along in 1894, '95, '96 and '97. The home prices were low enough—in most cases quite as low as ex-

port prices. But no sane man wants to return to the conditions of those years. And if there is some impatience on the part of the theoretical economists because of these exports—this 2 percent in June of all our production in iron and steel—at lower than home prices, would the removal of the tariff be a good way to get an adjustment? If German iron and steel syndicates, working under a protective tariff, are selling their products abroad at lower than their home prices, would it be good policy to make it easier for them to increase the amount of their surplus dumped upon the United States?

Apparently we are no nearer to any definite answer as to "how long will it last," unless it may be that prices still have an advancing tendency.—Current Iron Market Report.

The more distinctly the "advancing tendency" of prices shows itself, the more quickly light will be thrown on the question "How long will it last?" Prices of iron and steel are on a high level and the slightest advance from the prices of today may be the "last straw" that will cause the break in consumption. To have it commonly said that the prevailing prosperity is good for the first half of next year is to suggest that there are limitations that must make themselves definitely and distinctly felt. Just when the change will be met it is folly to attempt to predict, but nothing is more certain than that there is a cumulative effect of high prices; and from this the iron trade is in increasing danger as time goes on.

EXTENSIVE ADDITIONS.

(Special Telegram.)

PITTSBURG, Pa., Aug. 13.—A meeting of the board of directors of the United States Wire & Nail Co., of this city, will be held August 23 for the purpose of making arrangements for enlarging the company's plant at Shousetown, Pa., at an early date. It is probable that an open-hearth plant and blooming mill will be added to the present equipment. The product of the plant now consists of wire, wire nails, fence wire and telephone wire.

The Page Woven Wire Fence Co. is planning gigantic improvements at its plant in Monessen, which will cost in the neighborhood of $1,000,000. Cody & McMunn, of New York, are arranging to sell $1,750,000 of the issue of $2,000,000 bonds authorized by the company under its recent reorganization. The bonds are redeemable in 20 years and bear interest at 5 percent. They are secured by a sinking fund of not less than $100,000 a year. In connection with the offer of the New York brokers to sell these bonds an interesting statement of the company's affairs has been issued. In it there is promise of a yearly surplus of $700,000. It is shown that the total sales of the company for the year 1901 were $2,803,865, of which $1,371,186 was of the products of the Monessen plant and the rest from the plant at Adrian, Mich. Net profits were $372,944 and after the deduction of interest and extraordinary expenses the surplus is shown as $341,568. Fence sales for the three months ending with March are reported as showing an increase of 84 percent. The Adrian plant has a capacity of over 65 tons of woven wire fence each 24 hours. The Monessen plant starts with the pig iron as raw material, produces 100 tons of steel, 200 tons of steel rods and upward of 150 tons of galvanized wire daily. This plant is equipped with looms for weaving fence. It is estimated that the net profit this year will be $900,000 and with interest charges deducted about $100,000 and the sinking fund $100,000, the surplus is figured to $700,000.

The advancement of the company's business affairs is remarkable in view of the fact that it only recently emerged from its financial trouble. Sales of the Adrian plant increased from $740,142 in 1900 to $1,532,679 last year, according to accounts certified to by the New York Audit Co. Improvements at the Monessen plant have just been completed that make the wire capacity 200 tons daily.

A new heating furnace of 100 tons daily capacity has been added with costly mechanism for cleaning the rods. The rod mills are now closed for about two weeks during the installation of machinery for handling ingots. The company has a capital issue of $1,000,000 preferred stock calling for cumulative dividends at the rate of 7 percent. The common stock issue is $5,000,000.

SALE OF REPUBLIC MINE TO CAMBRIA STEEL CO.

The transfer of the property of the Republic Iron Co., consisting of the Republic mine on the Marquette range, the steel steamer Republic, the wooden steamer Continental, and the schooner Grace Holland, to the Cambria Steel Co., was consummated Tuesday, Aug. 12, when new directors were elected as follows: Powell Stackhouse, Philadelphia; A. P. Robinson, Philadelphia; Wm. Kelly, Vulcan, Mich.; H. S. Endsley, Johnstown, Pa.; John W. Townsend, Philadelphia; F. J. Firth, Philadelphia; Wm. D. Rees, Cleveland; Peter White, Marquette, Mich., and J. V. Painter, Cleveland. Mr. Stackhouse, who is president of the Cambria Steel Co., was elected president, and Mr. Robinson, who is assistant secretary and treasurer of the Cambria company, was elected secretary and treasurer. Mr. Townsend is first vice president and Mr. Endsley solicitor and general agent of the Cambria company. The offices in Cleveland will be kept open to close this year's business with Messrs. Rees and Castle in charge, but permanent headquarters will be in Philadelphia.

The Republic Iron Co. was organized in 1870 under the laws of Michigan with a capital of $500,000—20,000 shares, par value $25—upon which $12.50 per share was paid in cash. That is all that was ever paid on the shares. The shipping of ore was commenced in 1872 with 11,025 tons and the total shipments to December, 1901, were 5,014,855 tons. In 1873 the price of ore was $15 per ton, which declined to $12 in 1874. The mine has been immensely profitable, having paid in dividends $9,050,000. Deducting the amount paid in originally, $250,000, from the sale price, $1,500,000, leaves $1,250,000, which added to the dividends for the whole period, gives $10,300,000 as the net profits. The directors who retired Tuesday were: G. W. R. Matteson, Providence, R. I.; Samuel Mather, vice president, Cleveland; J. V. Painter, Cleveland; W. D. Rees, president and treasurer, Cleveland; Abraham Hart, Chicago; W. F. Dummer, Chicago; N. M. Kaufman, Marquette, Mich.; Peter White, Marquette. There was one vacancy on the board caused by the death of H. B. Perkins, of Warren, O. W. B. Castle was the secretary. The following had been directors at various times during the history of the company: David Morgan, Joseph Perkins, Dan P. Eells, Chas. Hickox, Samuel P. Ely, Edward Breitung, Jonathan Warner, G. W. R. Matteson, John N. Glidden, H. B. Perkins, M. B. Taylor, Wm. D. Rees, J. V. Painter, Reuben Hitchcock, Edwin Parsons and Jno. C. McKenzie.

The election of Mr. Rees as a member of the new board of directors was a graceful compliment to one who had long and faithfully served the company. Mr. Rees was agent of the company with headquarters at Marquette from April, 1876, to May, 1883; secretary at Cleveland from 1883 to 1891, and president from 1891 until Tuesday last. Mr. Castle entered the service of the company in 1882 as a clerk and was elected secretary in 1891.

The Consolidated Lake Superior Co. has just closed a deal by which it adds very largely to its holdings of iron ore properties on the Michipicoten range in the Algoma district of Ontario, and gives complete ownership of all the known iron ore deposits of value on that range. The properties were originally owned by Pickands, Mather & Co., Cleveland, and are adjacent to the Helen. The latter property lies on the border of a lake and the mining company has been at work for nearly a year pumping the water out of the lake so as to get the ore that lies under the water. This undertaking has been accomplished and the Consolidated found that it would be of advantage to secure the surrounding land.

EASTERN PENNSYLVANIA NOTES.

(Special Correspondence.)

LEBANON, PA., Aug. 11.—No less than 20 blast furnaces, some of them the largest east of the Alleghenies, are idle because of the coal strike and prospects for their resumption are not bright, although the managers are anxious to resume work. The district was barely through labor troubles attendant upon the regulation of puddlers' wages, when the coal strike began to be felt. There are idle several furnaces in the Schuylkill Valley, almost a dozen in the Lehigh Valley and two or three in this district, the Chester, Harrisburg and Lancaster districts being the only ones not seriously affected. Nos. 1 and 2 furnaces of the Pennsylvania Steel Co. in this place, better known as North Lebanon, shut down last week and it is said that more will follow and remain out until fuel is better.

The Harrisburg Foundry & Machine Works, which have been enjoying a period of great prosperity, will put a large new pattern shop into use soon and increase the night force. The works are building a number of engines for South Carolina and Louisiana industries as well as filling several for New York City.

The Lalance & Grosjean Co., of Harrisburg, will extend its tin mill plant in that city, negotiations being under way for the purchase of more land. The works will also have new annealing furnaces and gas producers and additional electrical equipment.

Large offerings of foreign material and scrap are being made at all Central Pennsylvania towns by agents at seaboard.

The old Mish foundry in this city has been bought by J. Wunderlich, who will operate it.

The Pennsylvania Steel Co. has commenced to occupy its new frog, switch and signal department buildings at its plant at Steelton and will soon transfer all of that department to the annex which will comprise about 15 buildings. The machine shops are said to be exceptionally well equipped.

The Lackawanna Iron & Steel Co. has about completed part of its coke oven plant at the Colebrook Furnaces in this city, and many changes are being made at the furnaces.

A new works for Lebanon will be the Lebanon Valley Iron Co., organized by the Messrs. Light, who are erecting here the plant of the Norristown Iron Works. The plant will be ready for use in the fall and will handle bar iron. There is some talk of a steel plant in the future. The new company will not be a part of the Lebanon Valley Furnace Co., chartered to take charge of the Lebanon Valley Furnace.

Reading and other stove makers are having hard times because of the strike. The shops in Berks county are making about four days a week. Better conditions are hoped for in the fall.

Mont Alto Furnace, one of the best known charcoal stacks in the Cumberland Valley, has been sold to the State of Pennsylvania for a forestry reservation and is being torn down at present. It was built early in the last century.

The D. Wilcox Co., of Mechanicsburg, machinery manufacturer, and the Landis Tool Co., Waynesboro, will make additions the coming winter.

A large amount of steel has been bought in Germany and England by companies in this part of the State. The Central Iron & Steel Co., of Harrisburg, among others, has been a buyer.

Within a month Bird Coleman and one Sheridan furnace will be started.

The Eastern Steel Co., which has taken over the plant of the defunct Pottsville Iron & Steel Co., as heretofore noted, has started the machine shops. The steel and rolling mills will be rehabilitated and run regularly.

Inquiries at Coatesville confirm the statement that next year the erection of a blast furnace will be started. The Lukens Iron & Steel Co. is interested.

Neiman & Stokes, of Reading, have leased a building at Hamburg, Berks County, and will establish a foundry. The company is about to place orders for equipment.

The Pennsylvania Steel Co. has been buying considerable pig iron of late and a number of others firms in this part of the State are on the lookout for iron. As soon as there is a probability of a break in the strike so that continued running can be assured it is expected that large contracts will be placed.

The Pennsylvania Capitol Building Commission will open bids for the new $4,500,000 capitol on Sept. 6. There will be a great deal of iron and steel construction and the contract, exclusive of the mural decoration, will be let to one firm if the bid of any one is satisfactory. The contract must be completed by Jan. 1, 1906. Bids will be received at Harrisburg. H.

THE "BOOKWALTER" PROCESS FOR STEEL CASTING.

To the Editor:

Several times recently there has been mention in the daily press of a greatly improved process in steel making, the patents for which were considered so valuable that the offer of $1,000,000 by a prominent manufacturer had been refused. Like a good many others, the writer was very curious to get the particulars of the alleged improvements and greatly amused recently to pick up one of the morning dailies in which appeared, under a flaming headline, a dispatch from Springfield, O., setting forth the particulars of the so-called "Bookwalter" process. So the secret is out, but our expectations are far from being realized, when the "valuable" process is described, and the claims and descriptions are given.. The whole article reads like an attempt by some parties to revive the so-called "Bookwalter" process at the expense of another patent process, which is known favorably among steel casting makers, namely, the Tropenas patent process. The "Bookwalter" process was exploited in this country about 15 years ago, and was the Roberts patent process (G. L. Roberts, of France, being inventor). In 1889 Mr. Bookwalter took out some patents in the United States upon some improvements, that have never been demonstrated to be practical.

It is claimed that some marvelous specimens of steel castings have been made at Brylgon foundry, of Reading, Pa., under the superintendency of S. S. Deemer, and the account would make it appear as if the steel was made in a "Bookwalter" converter. The facts are these: The Brylgon Foundry has used the Tropenas process for the past 18 months and a letter from the president of the company states that they are highly pleased with it. Their plant was started up under the direction of an engineer representing A. Tropenas, patentee. The writer has visited in Reading and seen the plant in operation and was given some sample castings made of Tropenas steel, and has also seen equally difficult castings made by other Tropenas plants in this country.

In the effort to give a technical description of the wonderful process exploited in Springfield, O., dispatches, the arrangement of tuyeres and the mechanical apparatus of the converter, etc., the Tropenas converter is pretty clearly described; but there are some particulars given which are glaring inaccuracies. For instance, the description says that the "heat" of molten iron (from which the steel is blown) represents something over 500 degrees F., etc., etc. Any metallurgist knows that lead cannot be melted at such a low temperature, say nothing of iron or steel.

The statement about 25 foundries using the "Bookwalter" process is also false, as the official records fail to make mention of them, and the statement that J. E. Schwab, president of the American Steel Foundries, had offered $1,000,000 for the patent and been refused is equally incredible. The whole article would seem to have been given out by persons who desire a brief notoriety at the expense of the facts and the known results accomplished by others.

Cleveland, Aug. 11. CHARLES A. PARSONS.

Rod mill No. 1 of the Sharon Steel Co., Sharon, Pa., which has been idle for some time, resumed operations this week. The wire and wire nail departments will also be placed in operation double turn shortly. The wage dispute between this company and the Amalgamated Association has been amicably adjusted and the scale has been signed.

The new furnace of the Northside Iron Co., Sharpsville, Pa., will be placed in operation shortly. The new engines have been given preliminary trials and everything is almost ready for lighting the furnace.

THE BERG CINDER AND HOT METAL CAR.

The William B. Pollock Co., of Youngstown, O., builder of blast furnaces and steel works, is manufacturing improved hot metal and cinder cars, which have been designed by P. T. Berg, of the Carnegie Steel Co. The designer's practical knowledge of cars of this type has enabled him to design a car uniformly strong and durable, the idea being to strengthen those parts which had a tendency to break down under continuous service or from sudden and unexpected strains or shocks. Figs. 1 and 2 will indicate the general construction of the hot metal car. The frame, trunnion ring and gears are of steel, and the side

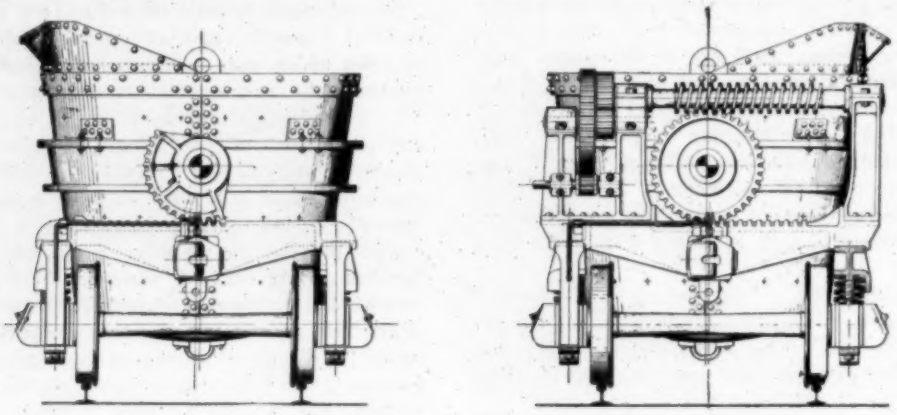


FIG. 1.—END ELEVATIONS OF HOT METAL LADLE CAR.

pieces or truck beams are interlocked with the end pieces or buffer casting and then riveted so as to make it practically as solid and rigid as if cast in one solid casting.

The trunnion ring is made to revolve and travel to the side of the car simultaneously for pouring by steel gears and pinions driven by a steel worm cut from a solid forging. These gears, pinions and worm are so arranged that the ladle can be easily turned over by one man, the use of the steel worm locking the ladle in any position. The car is of standard gauge, equipped with M. C. B. boxes and brasses and automatic coupler. The ladle has a carrying capacity of 20 tons of molten metal with an ample allowance of 15 to 20 percent for curves, grades, sculls, etc. The ladle is carried within the trunnion ring which relieves it from all external thrusts and prevents the natural tendency of the ladle to flatten.

The cinder car is shown by Figs. 3 and 4 and is similar in design to the hot metal car, the same idea being carried out in this as to the interlocking frame which is sufficiently rigid to relieve the ladle or trunnion ring from any outward pressure. The idea of the trunnion ring is for the support of the ladle only, and the latter can be easily and quickly removed from it. All parts of the car are made of steel with the exception of the boxes, brasses and trunnion ring. The worm is cut from a solid steel forging and the tipping of the ladle is accomplished in the same way as that of the metal car.

The car is of standard gage and equipped with M. C. B. boxes and brasses and automatic couplers, but, unlike the hot metal car, has double trucks with four wheels to each truck. The ladle has a capacity of 200 cubic feet and is furnished with a patent cast iron lining. The William B. Pollock Co. has the exclusive manufacture of both these cars, which have been in use for some time by steel works and furnace superintendents.

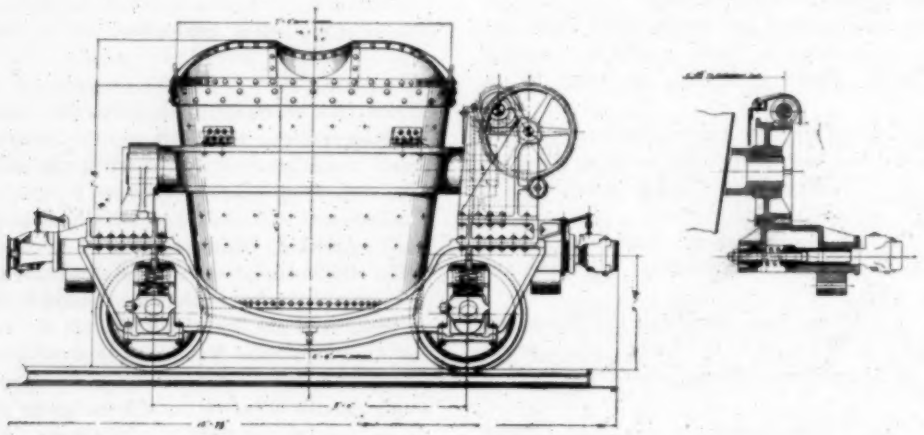


FIG. 2.—ELEVATION OF IMPROVED LADLE CAR WITH TILTING MECHANISM.

MODERN BESSEMER WORKS AND RAIL MILLS.

An article on "Economic Iron and Steel Production" in *Cassier's Magazine*, by Theodore W. Robinson, first vice president of the Illinois Steel Co., has this particularly interesting passage:

No industry has been more ready to recognize the merits of general discovery, or quicker to reap the benefits of new devices, than the manufacture of iron and steel; and a well-equipped plant is today the very embodiment of applied science. As we compare former types, it is patent that our present practice is essentially based on the underlying principles of a quarter of a century ago. The blast furnace, the converter, the open-hearth furnace and the rolling mill are still the agents of reduction and conversion. But here similarity ceases. Manual labor has been largely replaced by machinery; empiricism has given way to exact methods; tonnage has increased enormously, and products have been greatly diversified and cheapened.

It is not easy to concisely compare the old with the new, but for measuring the changes of the last three decades we can, perhaps, find no better yardstick than the steel rail. Its manufacture was not only the most important immediate result of Bessemer's discovery, but still affords the largest individual tonnage of any of the steel products.

The refining of the iron at the converter by the combustion of its own impurities is dramatically picturesque, and in comparison with the operation of twenty-five years ago presents a most striking example of the effectiveness of modern methods. At that time 200 tons a day represented a large output. Today a modern mill produces as much in twelve hours' time as the old one formerly turned out in a week. The increase in the number and size of the vessels, greater blowing power, and intelligent application of hydraulics and

electricity all have had their share in this metamorphosis. The casting pit has given way to the pouring of steel direct upon cars, and the man with the sledge, struggling with the ingot that would resist parting with its mold embrace, has been supplanted by vertical hydraulic rams that strip the ingot and remove the molds with ease and despatch. These are some of the elements that account for the increase in production from 5,000 to 85,000 tons a month and have caused the average efficiency of converting mill labor to become six times as great as it was under the old *regime*. As measured by the average results, one man now does as much work in the conversion of steel as six men did a short generation ago.

Twenty-seven hundred tons of steel rails, or enough to lay twenty-one miles of track, have been produced in a day by a single modern mill—a performance all the more remarkable because accomplished under specifications demanding a compliance with a sectional variation of 1-64 of an inch.

In appearance, at least, there is little in common between the existing and the early rail mills. In olden times the rolling of rails resolved itself largely into a labor proposition. A large force was required and the exhaustive nature of the work necessitated the presence of many extra or spell hands. The mill was a teeming hive of sweating humanity, hauling, raising, and showing the masses of white-hot metal from roll to roll, from pass to pass, with clumsy hooks and tongs, by very brawn and muscle. The morale of the labor employed was, as a rule, inferior to the average standard of today. The tendency was toward the development of brute strength rather than higher intelligence. Pay-day was the *bete-noire* of the mill superintendent, and a high thermometer was ever good cause for anxiety. Tonnage was low and practically irregular; costs were high and troubles regular.

The introduction of automatic machinery brought about a new order of things, and costs rapidly fell before increased production and decreased labor. The change was the means of temporarily throwing many out of employment, but the increased opportunities that were presented in the expansion that followed proved advantageous to labor as well as to capital. The rolling mill machinery that has replaced the former crude appliances is a monument to mechanical ingenuity and engineering skill. Massive and apparently unwieldly in design, it is yet delicate and accurate in its manipulation. Requiring but a few skilled mechanics for its operation, it is neither subject to the variation of temperature nor to the idiosyncracies of a large body of more or less irresponsible men. The driven runway, the movable table, the multiplication of rolls, the cambering machine, and the mechanical hot bed are some of the parts that have been introduced and have caused the former production of 200 tons a day to be increased twelvefold. Both by the intensity of production that has been permitted and by the reduction of labor that has followed the average result of a man's daily toil in the present rail mill is four or five times that of his predecessor.

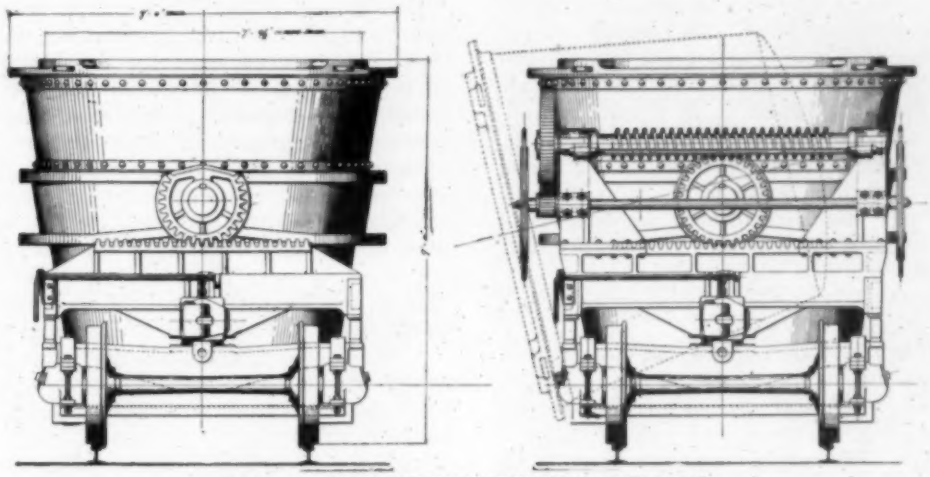
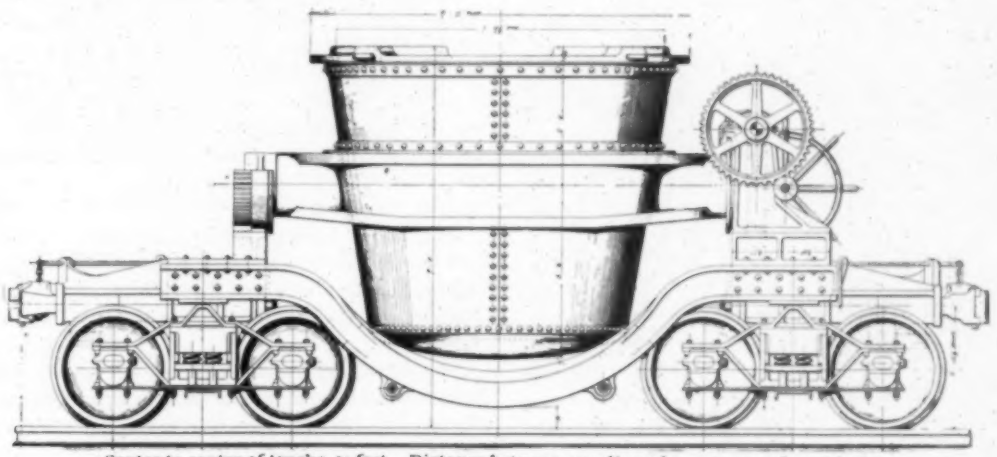


FIG. 3.—END ELEVATION OF IMPROVED CINDER CAR.



Center to center of trucks, 14 feet. Distance between coupling pin centers, 22 feet, 8 inches.

FIG. 4.—ELEVATION OF IMPROVED CINDER CAR.

It is probable that the new sheet, skelp and tube mills of the Sharon Steel Co., Sharon, Pa., will be placed in operation in about a month.

The Duluth & Iron Range Railroad, Duluth, Minn., is negotiating for the purchase of 550 additional steel ore cars with a capacity of 50 tons each. When this order is placed the company will have 850 steel cars. It is not probable that the cars can be secured, however, in time for the present shipping season.

The recently incorporated United Steel Co., of Canton, O., was organized last week. The board of directors is composed as follows: J. E. Carnahan, W. W. Irwin, George Evans, Charles Lang, William Blecker, E. A. Langenbach and Joseph Biechele. The directors organized as follows: J. E. Carnahan, president; Joseph Biechele, vice president; E. A. Langenbach, secretary and general manager, and William Blecker, treasurer.

GENERAL INDUSTRIAL NOTES.

The Chattanooga Machinery Co., Chattanooga, Tenn., has bought several lots and will erect a new plant.

A syndicate of Chicago capitalists including John Cudahy, A. D. Plamondon, Dr. J. B. Murphy, James H. Channon, Judge Edward F. Dunne, and W. J. Hilands, has purchased iron mines and furnaces at Paducah, Ky., and is arranging to put the furnaces in blast.

The Steel Ores Co., which was recently incorporated in New York State with a capital stock of $500,000 and $250,000 of bonds, has issued a statement describing the physical condition of the property and outlining its policy. The company will engage in mining, shipping and deal in high grade brown hematite, basic steel and iron and manganese ores. Its mines are located in Augusta County, Virginia. J. H. Everett is president of the company and Henry T. Fay secretary and treasurer.

The Guilderland Foundry Co., Guilderland, N. Y., having increased its capital stock from $3,500 to $25,000, will install a large quantity of new machinery to meet the demands of a rapidly increasing business. The present buildings are large enough to accommodate the new machinery.

The Peerless Automobile Co., Cleveland, is considering a proposition to move its plant to Lorain, O.

The American Car and Foundry Co. last year manufactured 64,140 cars and 800,000 car wheels.

The Sattley Mfg. Co., of Decatur, Ill., has been incorporated with a view to continuing the business of making malleable and gray iron castings. The company does not intend to do any building this year.

The plant of the Peninsula Foundry Co., of Newport News, Va., has been sold to Sayre Brothers, of Hampton, Va., for $15,000. The foundry which had relied since its establishment upon the work of the Newport News shipyard for its maintenance had been losing money since the shipyard started a foundry of its own.

The first lot of malleable iron castings at the Southern Car & Foundry Co.'s plant at Anniston, Ala., has been taken from the ovens and the product is highly satisfactory.

The Gleason-Bailey-Sciple Mfg. Co., Seneca Falls, N. Y., recently incorporated, succeeds the Gleason & Bailey Mfg. Co., manufacturer of gas and gasoline engines and pumps. The original firm of Gleason & Bailey was founded in 1840 and the pumps have an established reputation of over 50 years.

At a meeting last week of the stockholders of the Sharon Steel Co., the proposed increase of capital stock from $5,000,000 to $6,000,000 was authorized. The additional capital will be devoted to the completion of the mills now in progress of erection. The Sharon Steel Co. and subsidiary properties, including the Sharon Ore Co., represent an investment of nearly $10,000,000.

The keel for the first steel tug ever built especially for the fishing trade on the lakes has been laid by Bell's Engine Works at Buffalo. The new boat is for Wm. Wilson, of Erie, and will be 50 feet long, 12½ feet beam, and will cost $5,000.

The American Whitney Machine Co., of New York City, capital $50,000, has been admitted to Ohio to do business at Cincinnati. H. C. Van Winkle will be the agent.

G. Edward Osborn has been appointed receiver of the Osborn Machine Co., New Haven, Ct. The liabilities are $12,000 and the assets are said to be sufficient to meet all claims.

The Great Lakes Engineering Works, of Detroit, have secured the contract for the entire outfit of machinery for the Pacific Starch Co., of Tacoma, Wash. The contract must be completed within five months.

Williams, White & Co., Moline, Ill., are building a bath room for the molders and machinists in their employ.

Business men of Boyne City, Mich., are organizing a company to build a blast furnace in that city.

It is estimated that $5,000,000 will be expended during the next 18 months in Alabama in the erection of blast furnaces and steel plants.

At the annual meeting of the stockholders of the Star Drilling Machine Co., Akron, O., the following directors were elected: D. B. Duff, of Cleveland, F. E. Duff, of Beaver, Pa., William Greif, of Cleveland, G. J. Hoffman, of Cleveland, William Dabney, of Barberville, Ky., J. W. Miller, of Akron, and Homer A. Hine, of Akron. The officers elected for the coming year were: President, D. B. Duff; vice president, G. J. Hoffman; secretary and treasurer, Homer A. Hine; superintendent, J. W. Miller. The usual dividend was declared. The company now has several new buildings in course of construction and when they are completed 100 more men will be employed.

The first steel freight caboose ever made has just been turned out by St. Louis firms for the Lehigh Valley Railroad.

The American Car & Foundry Co. reports that earnings for the quarter ending May 31 were $2,008,000, nearly double the earnings for the corresponding period last year.

The National Tube Co. exported through Eastern seaboard points 2,121 tons of iron pipe last month, Europe was the largest purchaser, nearly 1,500 tons having been forwarded to various ports in the United Kingdom and Continental Europe. The shipments to the former part of the world represented an aggregate of 755 tons,, distributed as follows: Manchester, 549 tons; Liverpool, 167 tons, while the balance went to London. The exports to Continental Europe were consigned as follows: Antwerp, 435 tons, including one shipment of 380 tons; Copenhagen, 167 tons; Hamburg, 96 tons, and Genoa, 40 tons. Three hundred and fifty-five tons went to Chinese and Japanese ports. Other shipments were made to Egypt, Cuba, Australia, Mexico and Brazil.

A Washington telegram says that the tests to determine the feasibility of using oil for engine fuel on warships, conducted under the direction of the Navy Department, are nearing completion, and to a certain extent, have been satisfactory, although the element of danger arising from the percolation throughout the ship of combustible oil gases is yet to be overcome.

The American Steel & Wire Co. made export shipments through New York, Philadelphia and Baltimore of over 6,000 tons of wire and wire nails during July. Of wire 4,323 tons were sent to various parts of the globe. Australia was the largest buyer, 1,444 tons, including one shipment of 790 tons, having gone forward to Antipodean ports. The nail exports last month were made chiefly to Great Britain and the Far East. Seven hundred and three tons constituted the tonnage which went to the first-named part of the world, distributed as follows: Liverpool, 222 tons; London, 194 tons; Manchester, 103 tons, while the balance was about equally distributed to Hull, Bristol and Glasgow. The shipments to the Continent were made to Aarhuus, Trieste, Rotterdam and Constantinople. To China and Japan 521 tons went forward. Other wire nail consignments made last month went to South Africa, Chili, Brazil, Cuba, Cairo, and 231 tons to Australia.

The British electrical, engineering and contracting firm of Macartney, McElroy & Co., has placed contracts with the J. G. Brill Co., of Philadelphia, and the General Electric Co., for the furnishing of trucks and motor equipment respectively for utilization on an extension of the Durban municipal electric traction system, South Africa. The car bodies will be built in England.

The Heine Safety Boiler Co., of St. Louis, has recently taken orders for boiler equipment to be installed in the plants of the Kioto Traction Co., Kioto, Japan, and the Great Boulder Gold Mining Co., Ltd., of Great Boulder, West Australia.

The Kirk-Latty Mfg. Co., of Cleveland, manufacturer of bolts, announces that it is now operating its express wagon department, in which are manufactured all-steel express wagons, velocipedes, etc.

The East Street Shops, Springfield, O., which were partially destroyed by fire several months ago, have been transferred from Mayor M. L. Milligan to the Fairbanks Machine Tool Co. for $75,000. Senator Fairbanks is interested in the latter company.

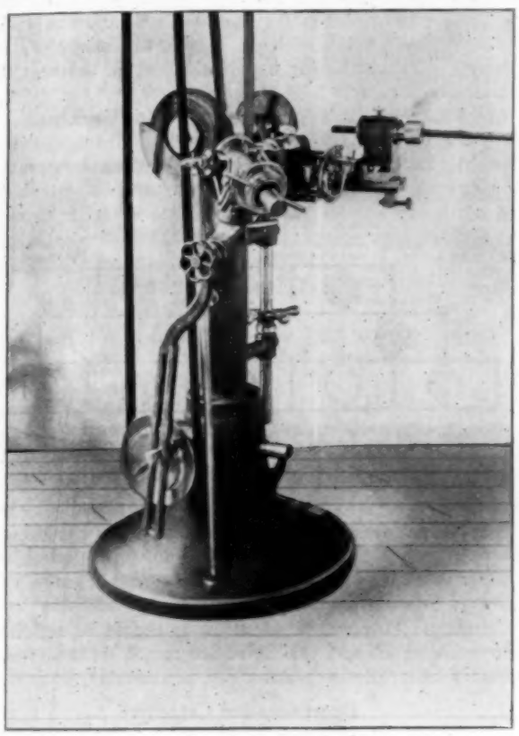
In a fire which damaged the office of P. & F. Corbin, New Britain, Conn., Aug. 8, the purchasing and sales department suffered the heaviest losses, many papers relating to orders being consumed, together with the entire collection of catalogues of the purchasing department of the American Hardware Corporation. Manufacturers are requested to send copies of their catalogues to the purchasing agent, A. N. Abbe, to replace those lost.

The Eastern Steel Co. has purchased additional ground at Pottsville, Pa., to be used for the erection of additions to the present plant.

THE LAPOINTE AUTOMATIC GRINDING MACHINE.

An interesting grinding machine has been patented recently by Joseph N. Lapointe, of Hyde Park, Mass. It is well adapted for grinding drills, either of the twist, chucking or long spindle variety, with two, three or four lips at any angle. The tool is sufficiently universal in capacity to handle not only drills but cutters, forming tools, lathe centers, etc.

The machine consists of a standard or column having at its upper end a table carrying the grinding wheels, work holders, etc. The head carrying the abrasive wheels is capable of a sliding movement along the ways by means of a crank pin entering a slot in the under side of the head. The crank pin is driven by a worm and gear located in the lower part of the column, and this mechanism causes a slow reciprocation of the grinding wheel across the surface of the work; the wheel wearing the more evenly, of course, on that account. At times this reciprocation of the grinding wheels may not be desirable, and means are provided for throwing this mechanism into or out of operation. An angle lever (bell crank) is pivoted to the base of the column and when the foot of the operator is



THE LAPOINTE UNIVERSAL GRINDER.

applied to this treadle the worm is drawn out of engagement with the worm gear. A spring latch engages with the upper side of the lever and retains it until the lock is released by an inward pressure of the foot.

The shaft carrying the worm projects through the standard supporting the machine and is driven by a belt pulley, on the outside of which is a disk. This plate has a T slot cut across the face holding an adjustable pin which works in the slotted link seen on the lower left hand side of the machine. The link is employed to give a movement of the work holder which will produce the proper backing off on the face of the drill or other tool which is being acted upon by the grinding wheel in order to secure the necessary clearance. The work table is pivoted and in connection with the slotted arm and the disk the holder is automatically moved to and from the wheel. The slotted arm is made in two parts, held together by a clamping screw so that they may be secured at any desired angle to each other.

In addition to this movement to secure clearance of the cutting edges, a portion of the work holder is given an oscillatory movement of rotation to enable the grinding wheel to act over the entire face of the drill. The chuck holding the drill is rotated in its casing. The chuck is seen in the illustration holding a large drill against the left hand wheel of the grinder. A gear fastened on the end of the chuck nearest to the spectator is in mesh with a bevel gear segment, which in turn is attached to a rod operated from the base of the column. The connections are made by means of universal joints and the connecting rod controls the motion of the segment as the work table is oscillated by the slotted link. The point of initial engagement of the gear and segment is controlled by making the connecting rod in two parts, one of which may be telescoped within the other and adjusted by a setscrew.

A gradual feed of the work holder toward the grinding wheel is obtained by a screw and hand wheel seen midway between the ends of the machine. The hand wheel has a rim formed with ratchet teeth engaging with a pawl. This is capable of being thrown out of gear by an adjustable stop when the surface of the work has been ground to a sufficient depth. The inventor points out that a safety device may also be provided to prevent undue strain upon any part by mounting the toothed rim to turn in a recess, the rim being retained in place by washers and screws tapped into the wheel. A bolt and thumb nut can be used to adjust readily the degree of frictional engagement between the parts. Obviously if the pull upon the ratchet becomes excessive the rim will slip and act as a safety device.

In using the machine to grind a drill or like tool having a plurality of cutting lips, the operator places it in a bushing of a suitable size and clamps it in the chuck of the work holder with the faces to be ground extending into proximity with the grinding wheel. The end of the drill may then be adjusted laterally, angularly and vertically of the wheel and the initial point of grinding can be controlled by the vertical connecting rod. The slotted link is adjusted to secure the desired amount of clearance and the stop screw and feed adjustment of the ratchet and hand wheel regulated to permit the requisite depth of grinding, as well as the feed of the carriage for each traverse of the grinding head. The worm gearing is then placed in engagement by the treadle and locked in position by the latch. The grinding wheel and driver are now started and the grinding is completed without further attention from the operator. The compound movements of the work holder repeatedly carry the tool automatically in the proper path to grind the surface with clearance. At the same time the grinding wheel is moved laterally against the work which is fed slowly toward it by the travel of the carriage and stopped when a sufficient amount of material has been ground off.

The work holder at the right hand side of the machine permits the grinding of pieces which could not be conveniently handled by the device at the other end of the machine. Crowning cutters, for cone pulleys, etc., having an edge formed on the arc of a circle are attached to a table having a graduated bar pivoted at one end. By adjusting the table upon the bed and the holder upon the table any desired arc of movement within the range of the bar can be secured, the holder bar being swung by the operator upon its pivotal point back and forth across the grinding wheel. Single lip drills may be ground by a method similar to the one shown at the right of the machine. A sleeve having a cam surface at one end holds the drill in a stock mounted on the table. This arrangement by the movement of a rod over the cam passes the entire face of the drill over the grinding wheel, the drill being at the proper time advanced by the table feed.

The annual meeting of the St. Louis Foundrymen's Association was held last week and officers for the ensuing year were elected. The association is affiliated with the National Founders' Association and nearly all the foundries in St. Louis and vicinity are affiliated with this local organization. Fred Schwedtman, president of the Magnetite Foundry Co., was elected president; William Medart, secretary of the Medart Patent Pulley Co., secretary and treasurer. The board of directors is composed of the officers named above together with the following: W. S. Simpson, president of the Christopher & Simpson Architectural Iron Co.; G. F. Cottrill, vice president Green Car Wheel Co., and J. C. Davis, manager Leighton & Howard Iron & Steel Co.

Recent Blast Furnace Practice.*

BY BRIERLEY DENHAM HEALEY.

Within the past few years the question of blast furnace practice has attracted considerable attention, even outside metallurgical circles, and has been seriously discussed in the public press. At one time the British iron industry has been threatened with extinction, while at other times we have been assured that large combines were being formed to protect it. Forty years ago the British ironmaster could take things comfortably, as in most cases a well-managed iron works at that time was a veritable gold mine. Then the output of furnaces

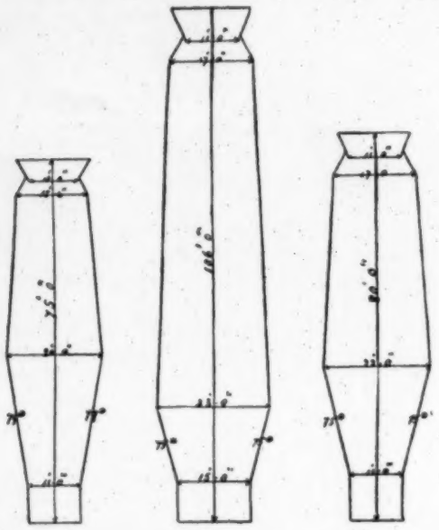


FIG. 1. FIG. 2. FIG. 3.

seldom exceeded an average of 200 tons per week, whereas at the present time we have several British furnaces which smelt 200 tons a day. The great leaders of this most important industry are now fully alive to the fact that if they do not move with the times, the times will move along without them, or to quote the words of our observant Prince, "they must wake up." The only danger which awaits them is that if they wake too suddenly they may adopt methods which have not been sufficiently proved.

For at least three decades very little has been done in

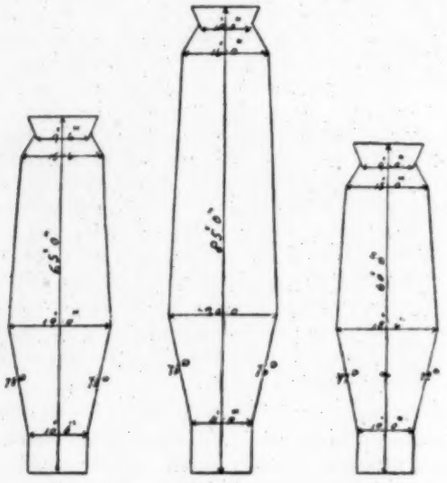


FIG. 4. FIG. 5. FIG. 6.

this country to improve the wasteful methods of utilizing its vast mineral wealth, and our total production of iron for last year was only 7,385,198 tons, whereas during the same period a total of 15,878,354 tons was produced in the United States of America. As a general rule, fuel has been so imperfectly consumed that at least 60 percent has passed off in gaseous form to pollute the atmosphere, notwithstanding the numerous inventions for the prevention of smoke, and the penalties which may now be imposed by parliamentary authority.

*Paper read before the Society of Engineers (England), May, 1902.

The by-products from iron smelting furnaces, and from gas producers for heating furnaces generally, have received very scant attention until within the last 10 years or so, and even now very little actual work is being done, although at most of the works of modern design by-product plants are certain to be profitable where the weight of coal used justifies the expenditure. In the following paper the author proposes to describe a typical blast furnace plant comprising all the most recent improvements in practice.

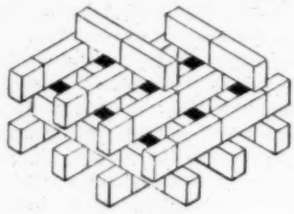


FIG. 7.

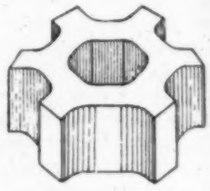


FIG. 8.

The first thing to be considered is the selection of a site for the proposed smelting plant. Here the leading essentials are the localities of the fuel and mineral, and the delivery of the finished product with the view to minimise the cost of carriage. The site having been decided upon, the next thing is the general arrangement of the plant.

In grouping a smelting works, the following are the chief items for consideration, viz., the smelting furnace, the hot-blast stoves, the equalization of air-blast temperatures, the blowing engines, the power generators, tuyere and bosh cooling, stock of minerals and fuel, furnace charging apparatus, pig bed for iron output, slag removal and disposal, lighting

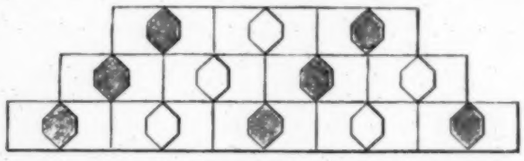


FIG. 9.—METHOD OF CHECKERING, FORD & MONCUR STOVES.

the works, repairing and fitting shops, and chemical laboratory.

The author does not intend to discuss fully the details of the foregoing items, each of which would form the subject of a paper in itself. His description, however, will embody comparisons between old and new methods, while some results of recent working will be given which should be sufficient to convince iron masters that there are means to hand whereby ordinary blast furnace practice can be materially improved.

Dimensions and Capacity.

It has already been stated that 40 years ago 200 tons per week was an average output, and the author well remembers

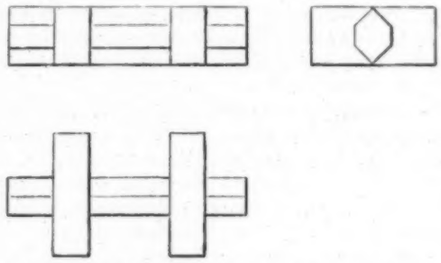


FIG. 10.—CHECKERING FOR FORD & MONCUR STOVES.

the erection of new furnaces in 1863 which were to astonish the world. Their output reached 420 tons per week, and they had open tops around which was a flue to take off the gases. The pressure of the air blast was nominally 5 pounds, but more generally 4 pounds per square inch, and the heat of the blast from the pipe stoves, then in common use, varied from 500 degrees to 700 degrees Fahr. The furnaces referred to certainly produced very good iron, chiefly for conversion into Bessemer steel, and there was generally but little difficulty in the working.

Those were the days when various internal capacities were experimented upon, with varying sizes of the hearth, minute angulations of the bosh of furnace, and the question of maximum height or burden of charge that the fuel would carry. The questions of higher blast pressure and increased temperature were not even thought of in 1863, and to have mentioned a special charging apparatus for each furnace would have been considered sheer extravagance. The author has very vivid recollections of labor saving designs which he made 30 years

FIG. 12.

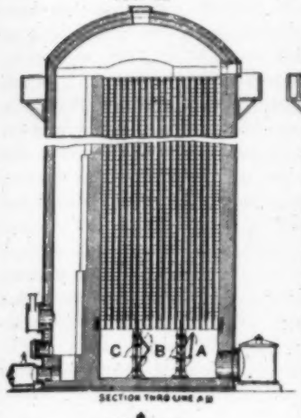
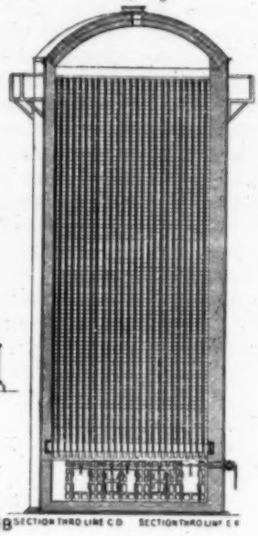


FIG. 13.



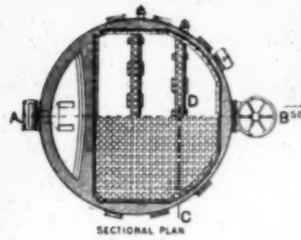


FIG. 11.

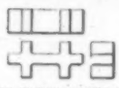


FIG. 14.

ago, only to be put aside for 20 years, but which are now in full use, saving in some works as much as £3,000 per year.

It is now well known that the internal capacity of a furnace should not be too great in proportion to the output. The furnace itself should be as high as the structure of the fuel will carry, and the blast pressure should be much greater than hitherto. The material within the furnace will then descend at a maximum rate, and the loss by radiation being nearly the same, regardless of quantity smelted, will be in inverse ratio to the output. The temperature of the air blast should be uniform and much higher than formerly, and adding to

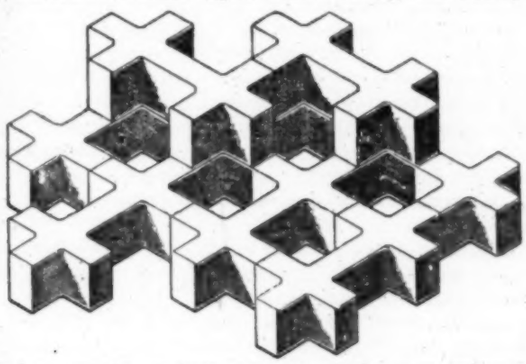


FIG. 15.—METHOD OF CHECKERING, STEVENSON & EVANS' STOVES.

this an increased burden and extra power obtainable by means of suitably designed engines, the output should be in direct ratio to the weight of the air blast actually delivered to the furnace. All furnaces should be properly equipped with some form of bell top, in such a way as to prevent any serious loss of gas, as this has now become more valuable than ever owing to the introduction of apparatus for cleansing and using it by means of internal-combustion gas engines, and for obtaining various by-products.

The advantage of driving a furnace at its greatest rate can be determined with comparative certainty by ascertaining the capital and renewal charges per ton of iron made during its life, as against the cost of production by another furnace at a lower rate, and the maximum rate of driving which may be possible will be settled partly by the ability to feed the furnace with material and partly by the time required to rebuild one furnace while another is working.

The following tables of comparison between American and British blast furnaces provide very interesting and valuable data. The American furnaces are illustrated in outline in Figs. 1, 2, 3, and the British in Figs. 4, 5, and 6.

The internal capacity of the furnaces, indicated by Figs.

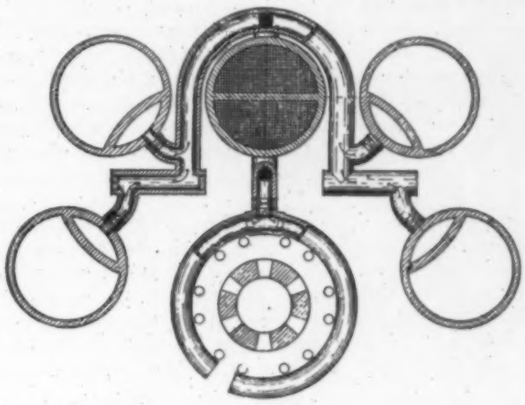


FIG. 16.

4 and 5, is such that with uniform weight of air blast on each the output would be about equal, assuming them to be working on the same material, and the output of all the furnaces shown by Figs. 4, 5, and 6 may be considerably increased by an additional weight of air blast.

To make a fair comparison between the tonnage of different furnaces, due allowance should be made for the character of the mineral used, as it is well known that some minerals contain less than 28 percent of metallic iron, whilst some hematite ores contain nearly three times as much. The following are representative analyses of the essentials for the production of hematite iron, and of the liquid and gaseous effluents therefrom.

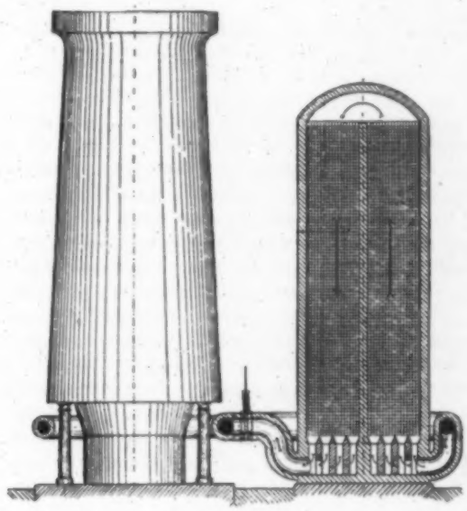


FIG. 17.

Analysis of Furness Hematite Ores:—Peroxide of iron 83.00; silica, 15.50; moisture, 1.50; carbonate of lime, trace; total, 100.00.

Analysis of Furness Limestones:—Carbonate of lime 95.00; carbonate of magnesia, 4.20; silica, 0.50; alumina, 0.30; total, 100.00.

Analysis of Durham Coke:—Carbon, 92.38; ash, 6.00; sulphur, 0.70; moisture, 0.92; total, 100.00.

Analysis of Gases from Furnaces using Hematite Ore and Durham Coke:—Nitrogen (by volume), 58.51; carbonic oxide, 30.97; carbonic acid, 8.36; hydrogen, 2.16; total, 100.00.

Analysis of Hematite Pig Iron:—Iron, 92.33; carbon, 3.22;

sulphur, 0.02; phosphorus, 0.04; silicon, 2.94; manganese, 1.45; total, 100.00.

Analysis of Slag from the foregoing:—Silica, 38.00; alumina, 12.03; lime, 42.19; magnesia, 1.65; sulphuret of calcium, 2.45; protoxide of iron, 2.08; potash, 1.60; total, 100.00.

Hot Blast Stoves.

Formerly hot blast stoves were constructed of nests of cast iron pipes, erected upon cast iron base unions, the entire metallic structure being placed within rectangular brick chambers, which were lined with fire brick, and provided with fire grates. In later times, however, although the fire grates were generally retained, along with the collection of the otherwise waste gas from the furnace tops, came the addition of gas-firing apparatus for heating the air blast. Owing partly to less cold air passing in, and because the firing doors and ashpits were then sealed, the temperature was then more uniform and generally increased to about 800 degrees Fahr. in the best constructed stoves of that type.

About thirty-three years ago the Whitwell recuperative hot-blast stove was introduced. This system comprises an arrangement of firebrick walls within an iron casing, and with a set of valves for directing the gaseous currents inwards and outwards as required. The associated brickwork of the interior did not lend itself properly to the rapid absorption of heat, and consequently was slow in giving it up again owing to the heating surface being insufficient, but the maximum temperature then obtained was 1,200 degrees Fahr. Then came the Cowper stove, with its chambers filled with firebricks, which when built up as shown in Fig. 7 presented numerous square cells leading from the top to the bottom of the stove, and the maximum temperature attainable was 1,400 degrees Fahr. The dust lodging upon every horizontal ledge prevented the checkering absorbing the heat within the time theoretically allowed, and consequently this class of checkering always gives lower results than might be expected. The Cowper checkering was afterwards improved by the use of star-shaped bricks, as shown in Fig. 8, which are hexagonal in shape with six lugs projecting at 60 degrees from each other. When set together the lugs join and form other hexagonal passages besides the one contained within each brick.

The Moncur stove checkering, with its projecting V lugs, is better than the Cowper filling, but in the opinion of the author it does not satisfy up-to-date requirements, which demand a freedom from all ledges where dust can lodge, and a maximum surface of heat-absorbing material, placed within a casing of minimum capacity. The most suitable bricks for the Ford and Moncur hot-blast stoves, and the method of packing them, are shown by Figs. 9 and 10, from which it will be seen that the flat walls are well bonded together.

Next in importance is the checkering of Stevenson and Evans. This setting is so designed that the bricks cannot be displaced, either by scraping the vertical flues or by the action of the cleaning gun, as the checkering is all bounded together. By a proper manipulation of the chimney valve and hot-blast valve the dust may be quickly cleared out, instead of by using the cleaning gun, as there are no ledges on which the dust can lodge. Figs. 11 to 13 show a stove on this system. Fig. 14 shows an enlarged detail of a brick for the checkering, while Fig. 15 shows the method of setting the bricks so as to make good bond. When the stove is put on gas, the flame, after rising in the combustion chamber, passes down the whole of the checkering for about two hours, during which period the various sections A. B. and C receive a proportionate amount, until about two-thirds of the filling is saturated with heat at the maximum temperature. The gas is then shut off and the stove changed in the usual manner, and the blast has a free passage through each section for the same period.

It has been the custom in many works to use three stoves per furnace, but in most of the modern works four are used. Some managers are of the opinion that more heat is lost by radiation and conduction with an equalizer, but with three stoves and an equalizer there would be no more loss in this direction than from four stoves. With the old cast-iron pipe stoves the temperature was low but regular. There was not nearly as much trouble with furnaces "hanging," and in the few works that still use pipe stoves such a thing as a furnace "hanging" is of very rare occurrence. Hence the importance, first of preventing the ingress of dust into the stoves and second, of maintaining the air blast at a uniform temperature.

Working with high heats generally means low coke; in other words, maximum heat, minimum coke, and although it has often been asserted, it has not been proved that high heats are worse for the furnace. The recuperative stove can be worked at any practical temperature, and if only a low heat is wanted it can be got just as well with a regenerative stove as with a cast-iron one.

Want of uniformity in temperatures is one of the chief causes of irregularity in working, and the author is of opinion that the benefit of the hotter blast given by recuperative stoves has not been fully obtained owing to the insufficient capacity of the apparatus. In a very short time after recuperative stoves came into use, it was discovered that when the heat-absorbing surfaces of the direct combustion recuperative stoves became covered with lime, carried into the stoves along with the blast-furnace gases, the stoves very quickly lost their heat-recovery or recuperative efficiency. Now, if the stoves could be heated with producer gas made from cheap coal, as suggested in a paper* read at the Iron and Steel Institute meeting last September, not only would very much higher stove temperatures be obtainable, but the temperatures could be maintained at a suitable and uniform elevation, and the output of iron would be higher and more uniform in quality. The value of the blast-furnace gas set free by this system would more than compensate for the cost of the coal and labor used at the producers, and the increased output of iron and its better quality would thus be gained without cost.

PROPORTIONS OF AMERICAN FURNACES.

A Furnace, Height in feet.	B Hearth, Diameter in feet.	C Bosh, Diameter in feet.	D Internal Capacity in cubic feet.	E Capacity per ton per diem.	F Tons of Iron smelted per diem.	G Temperature of Blast, °Fah.	H Lbs. of Coke per ton of Iron.	J Pressure of Blast per square inch.	K. Cubic feet of Blast per minute.	L. Cubic feet of Blast per ton of Iron.
75	11	20	14,600	73	200	1100	1912	5	16,000	115,200
80	11	22	19,800	60	330	1100	1884	10	25,000	109,090
106	15	23	26,500	46	570	1100	1780	15	50,000	126,315

PROPORTIONS OF BRITISH FURNACES.

A Furnace, Height in feet.	B Hearth, Diameter in feet.	C Bosh, Diameter in feet.	D Internal Capacity in cubic feet.	E Capacity per ton per diem.	F Tons of Iron smelted per diem.	G Temperature of Blast, °Fah.	H Lbs. of Coke per ton of Iron.	J Pressure of Blast per square inch.	K. Cubic feet of Blast per minute.	L. Cubic feet of Blast per ton of Iron.
60	10.0	18.5	10,012	105	95	1100	2352	5	9,540	144,606
65	10.5	19.0	12,610	87	145	1102	2268	6	13,500	134,068
85	11.0	20.0	18,495	89	206	1100	2206	7	17,263	120,673

Equalization of Air-Blast Temperatures.

In the ordinary working of the various forms of recuperative hot-blast stoves, there is inevitably a fluctuation of the temperature of the hot blast to the furnaces. This in some cases ranges from about 1,000 degrees Fahr. to 1,400 degrees Fahr., and interferes with the steady working of the furnaces. The equalizing apparatus resembles somewhat an ordinary stove. It is built with a central division wall, and is entirely filled with checker-work; so that the hot blast, although enter-

* "The Profitable Utilization of Blast Furnace Gas," by B. H. Thwaite.

ing at varying temperatures, becomes equalized, and it then enters the furnace at an average temperature. A little while after putting the apparatus into operation, the blast, in passing through, arrives at a mean temperature, and if the recuperative medium is of sufficient capacity, about one-third of the checker-work should always be at the maximum temperature. The difference in the maximum temperature, say between a new stove and an old one, or between a clean stove and a dirty one, working on the same furnace, might be 460 degrees Fahr., as already stated.

In America, and perhaps in other places, it is the practice to level the heats by means of cold blast. This is done by admitting cold blast into the hot-blast main, to keep the heat down to what may be termed the minimum temperature. Regulating the temperature in this way demands careful and constant attention, and it is obtained at the expense of reducing down to the minimum temperature, with the additional risk of bringing it too low, and, morover, thermally, it appears to the author to be a most economical system. The difference between the quantity of heat carried into the furnace by the blast at 1,200 degrees and that at 1,000 degrees is equal to the combustion of about half a cwt. of coke per ton of iron made, and represents the difference between using the equalizer and the practice of diluting with cold blast.

The equalizer at the Normanby Iron Works, Middlesbrough, is the invention of Messrs. L. F. Gjers and J. H. Harrison. It is 20 feet diameter by 55 feet high. Figs. 16 and 17 show the construction of the equalizer. Autographic curves taken with a Uehling pyrometer showed that the average temperature when on the good stove is 1,100 Fahr., and when on the dirty stove it is only 975 degrees Fahr.

(Concluded in next issue.)

The old story that a great combination of English steel companies is to be formed has been revived and this time the Nova Scotia Steel Co. and the Dominion Iron & Steel Co. are connected with the rumored plans. Officers of these companies say there is no truth in the reports.

M. A. Hays has severed his connection with the Southern Railway, as agent in the East for the Land and Industrial Department, to become secretary of the Chamber of Commerce of Sault Ste. Marie, Mich. The Michigan Lake Superior Power Co. has now completed its vast power canal, utilizing the fall of water between Lake Superior and Lake Huron, and has ready over 50,000 electric horse power, to be sold to factories. Free sites will be furnished approved industrial establishments. There are especial advantages for wood working factories, tanneries, woolen mills, flour mills, pulp and paper mills and other industries.

The National Tube Co. has secured a contract for a quantity of steel poles for use in the Sydney City & Suburban Tramways, New South Wales, which system is being equipped with an $800,000 central power station, the contract for which was alloted to the General Electric Company. The plant will shortly be extended, which will result in an expenditure of at least $500,000. The boilers in the initial plant are of the Babcock & Wilcox type. The engines are of Allis manufacture. The piping, etc., are of Pittsburg make, the Burt Manufacturing Co., whose New York offices are in the Taylor Building, 39 and 41 Cortlandt St., having secured the order. The generators are General Electric build. The plant now under construction will develop some 6,000 horse-power. It is proposed to increase it by 5,000 horse-power, making the total capacity over 11,000 horse-power

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The Allis-Chalmers Co. has secured a contract for two 500 horse-power compound engines for shipment to South America. The engines are being built at the Edward P. Allis shops at Milwaukee, Wis.

We have received the second number of *Industries*, of Youngstown, O., an 18-page paper, devoted to the iron and steel and metal-working interests of the Mahoning and Shenango Valleys. E. J. Reilly is managing editor and J. G. Butler, Jr., Robert Bentley, Porter Pollock, John O. Pew and F. B. Medbury are directors.

LAKE SUPERIOR IRON MINES.

The two incline shafts at the Beaufort mine, recently acquired by Cleveland Furnace Co. interests, now building a blast furnace at Cleveland, are going down steadily. Nothing in the way of shaft connection will be done until new machinery arrives. The company will erect eight new dwelling houses, a machine shop, boiler and engine house, coal trestle, and will otherwise improve the surface. There is a call for ore of this class, recent orders from the company being more than the mine can fill until it is better prepared for work. After being worked for a time, this mine was surrendered in 1888 by the operators to the fee holders.

The Oliver Iron Mining Co. has secured control of the old Hancock property on the Felch Mountain range, about four miles from the village of Metropolitan, and has an exploring party at work. An old pit has been cleared out and an exploratory shaft is being sunk. This shaft has now reached a depth of 45 feet. Some standpipe work for diamond drill operations is also in hand. The Hancock never was a shipper and exploratory work done in 1876 was confined to testing and sinking. Some good ore was found, averaging about 55 percent in iron and .013 in phosphorus, but the percentage of silica was so large as to render it unmarketable at that period. There is a good demand for ore of this class at present.

The Zenith Furnace Co., which has recently obtained control of the blast furnace at West Duluth, has purchased the lease of eighty acres of mineral land adjoining the Cincinnati mine at Biwabik.

Sensational reports of discoveries of ore near Highland on the Duluth & Iron Range are not generally credited. It is not believed that ore will be found in any considerable quantity in this locality.

The Duluth, Mesabi & Northern ore dock at Duluth made a world's record in loading the steamer James Hoyt with a cargo of ore last Friday. In less than two hours 5,439 tons of Oliver ore were put aboard and the vessel was ready to make her trip down the lakes.

The Dickey Mining Co. has been organized at Marquette with a capital of $25,000 and the following board of directors William F. McKnight of Grand Rapids; Timothy Nester of Munising; John R. Gordon and Rush Culver of Marquette and John M. Duffy of Chicago.

The company will operate on the homestead, which is within the city limits of Iron Mountain, and includes 160 acres of what is regarded as exceedingly valuable mineral land. It has a frontage on Lake Antoine, and lies between the Chapin and Traders mines, both well known producers of fine grades of ore.

The Mesabi Central & Exploration Co. has disposed of all its holdings on the Mesabi range to a Pittsburg syndicate, headed by E. H. Jennings, for $250,000. The sale includes the fee of the Republic mine, situated in the east half of the northwest quarter in 14-58-19, also the fee to thirty-seven other well selected forties in townships 58-18 and 58-19. The lease, which is owned by the Republic Iron & Steel Co., carried with a royalty of 18 cents per ton, with a minimum annual output of 75,000 tons.

Much interest has been manifested in the placing of valuations on the iron mines of St. Louis county, Minnesota. The total valuation submitted by the mine owners was a little over $9,000,000 and this amount was raised by the taxation board to $30,165,012. Those assessed at over $1,000,000 were: Adams, $1,898,707; Biwabik, $1,173,937; Fayal, $2,956,350; Malta, $2,046,020; Mountain Iron and Rathbun, $1,217,500; Stevenson, $1,636,000; Chandler, $1,097,730; Pioneer, $1,437,537.

The Dominion Iron & Steel Co., of Sidney, Cape Breton, Nova Scotia has ordered forward its fourth blast furnace lining from the Portsmouth & Kentucky Fire Brick Co., of Portsmouth, O., which also furnishes the same company several cargoes of steel works brick. The Portsmouth & Kentucky Fire Brick Works have just closed a contract for fire brick for a complete plant, furnace and stoves, for Plattsburg, N. Y. They have also orders for complete blast furnace and stove plants at Marquette, Toledo and Detroit—all new plants—besides orders for more than 6,000,000 of fire brick for the United States Coke Co., steel works and current repairs for blast furnaces all over the country.

The Metric System by Compulsion.

The proposed Congressional action in regard to the metric system brought out many comments from manufacturers, and we submit several letters from prominent engineering firms upon the subject. The first on the list is a communication from Prof. John E. Sweet, addressed to *The Iron Trade Review*. The others were sent to the secretary of the Franklin Institute, and are reprinted from its *Journal*:

The Straight-Line Engine Co.

To the Editor:

During the recent agitation of the subject, the most noted advocate of the system before the Congressional committee was Lord Kelvin. His argument in its favor is based on the fact that it was devised by scientists and is scientific. That may all be very well, but would it not have been more sensible to put the matter in the hands of men who knew something about weighing and measuring in a commercial and constructive way? The metric system may be scientific but unnatural, while our English system is the natural one. One man's experience in a given line is worth more than all men's opinion based on theory or their experience in another line. Lord Kelvin's and Prof. Brashear's experience has shown them that the metric system is preferable and perhaps perfect for their scientific work, not only for the mathematical part, which we all admit, but for their constructive work as well, but all that ought to count as nought against the forty years' experience of Wm. Sellers & Co. who have had both the English and metric systems working side by side—not exactly on the same work but on work that certainly put the metric system at its best, and yet they are as strenuously opposed to all attempts to force its use on the manufacturers of this country as any one can possibly be, unless it is Rear-Admiral Melville, who ought to know as well as any one what is wanted in the government shops, and it is only in the government shops that it can be enforced. It is admitted that it cannot be enforced on the people in general, and that if it is adopted (though how it can be adopted any more than it is is hard to see, for it has been the only legal stanard for about 40 years) that we will not have to work by it, but only do as we do now and give the distance in milimeters calling them by their French names, which will add another (and the worst nuisance one can think of) to our present system (which the advocates of the metric system make their strongest kick against) of "complication."

Another point made by Lord Kelvin and other advocates of the metric system is that we should be in accord with other nations, and they say all nations except England, Russia and America have adopted it. This is a point where nations don't count. It is probable that England and America do more weighing and measuring than all the rest of the world. Mexico counts as a nation, while it is doubtful if the whole of this nation does as much weighing and measuring as the city of Cleveland alone. None of the nations where the metric system is legal, use it exclusively. As to the advantage of a universal system among nations, it is almost wholly imaginary, whereas a system that is commensurate throughout a country is of the utmost importance. Our land measure cannot be changed, that is admitted. Our system is commensurate with it, the metric is not, so it simply won't fit. If adopted at all it should be adopted universally; that cannot be done except by compulsion because it is not so good as our present system, and people are not going to give up a good thing for a bad one if they can help it. It cannot be forced on the people by law without changing the constitution.

The cost of the change could not be estimated, and instead of using figures it would call for more figuring the first ten years than there has been in the last 25. The men who make figures, scales, weighing machines, peck measures, and baskets could well afford to buy up Congress to pass a law compelling the universal use of the system if it were constitutional and possible to enforce it. JOHN E. SWEET.

The Tabor Manufacturing Co.

I may say that I was led to endorse the action of the special committee of which I am a member, from the preponderance of evidence in its favor, and not because I consider the metric system as ideal in every respect.

I have never regarded it with favor from the standpoint of practical utility in the workshop, because the numeration does not permit of continuous subdivision by 2. This inherent defect, for which the system is not primarily responsible, can, of course, never be eradicated except by a revolution which would for a time involve the whole industrial world in a chaos of doubt and confusion. The benefits to be derived from a change in our system of arithmetical notation are obvious, but the difficulty of unlearning the multiplication tables to which we are accustomed, and learning new ones which will more perfectly harmonize the practical and theoretical conditions to be met, seems to me insurmountable.

There are too many or not enough unit figures in the Arabic system of notation, and the simplest conceivable change would be to obliterate the numerals 8 and 9. If this were done we would then have a decimal system capable of continuous subdivision by 2, and a metric system adopted to this notation would be ideal in every respect. Subdivision by 2 is the simplest and most natural method of scaling down, and that it will continue to assert itself whether the metric system prevails or not is evidenced in many ways. We have already a decimal currency, but in spite of this, stock continue to be quoted in fractions of halves, quarters, eighths and sixteenths, and brokers take commissions of ⅛ and 1-16 of 1 percent. The kilogram is divided into halves and quarters, for the convenience of tradesmen, and the tendency to divide all metric units in the same way, thus leading to longer and longer decimals in the expression of values, can never be checked. And again, for lineal dimensions there is no scale comparable in clearness with that formed by the natural method of continuous subdivision by 2, and in the use of such a scale for drawing, no decimal scale can compare with it in adaptability.

That the metric system does not lend itself to this natural method of subdivision seems to me deplorable but irremediable in our present advanced stage of civilization. We have started wrong and cannot change however much we may desire to do so; the accumulations of knowledge are too vast to be modified, and as a matter of fact there is no alternative but to accept the inconvenient Arabic system of notation as forever fastened upon us.

Then, having done this, it is perfectly clear that there is but one system of weights and measures in the world today, and the best that can be devised on the notation to which the whole world is committed.

The practical convenience of the workshop must, I believe, give way to the overwhelming theoretical advantages of the metric system. These advantages cannot be successfully disputed, and I have therefore been compelled reluctantly to admit the adoption of the metric system as a wise step for this country to take. Any system is better than none at all, and no system founded on the natural subdivision by 2 would with our present notation be acceptable to the great army of thinkers who plan the work of the world.

Therefore, let us have the best attainable, though it may not be the best conceivable. WILFRED LEWIS.

Brown & Sharpe Manufacturing Co.

We would understand that the purport of such report as has been made is the support of certain legislation by the National Government, which is favorable to a general adoption of the metric system of weights and measures in this country. We would say that in general we are opposed to such legislation for several reasons.

In the absence of convincing argument to the contrary, we would feel, first, that the metric system in itself is not a better system than the English for the purposes of engineering trade; and secondly, even granting its merit, we question whether any such enactments of the National Government would accomplish the desired ends. We believe the American people are too much wedded to the English system to give it up because of any national legislation. We well know that the support of the Franklin Institute will carry more or less weight for or against the proposed measure, and trust that, if it is deemed advisable to adopt any measures of such character, it will be along the most conservative lines. HENRY D. SHARPE.

General Electric Co.

I am glad to note that a special committee of the Franklin

Institute has taken up the question of the adoption of the metric system for our standards, and has reported upon the matter favorably.

In my opinion we need the system, and I hope it will become international. We need it because it is a rational system connecting measures of length with those of area, volume, etc. It appears to me that our people have been long enough under the incubus of "long" and "short" tons, "long" and "short" hundredweights, "dry" quarts, "liquid" quarts and the like; units without any rational relation, or often with curious fractional relationship to one another.

I doubt whether there are many persons who could state the various measures and their values as learned in childhood. If such measures as our measures of length in feet and inches were the only things concerned, I should not advocate a change, but the question is far broader than that of a set of linear units, and the metric system is the only existing rational system which can be substituted for the irrational measures we now have.

I realize that in changing to the metric system, many of our industries will be subjected to some confusion and perhaps considerable expense. I do not think the change can be forced or accomplished by any sudden, revolutionary, process. It seems to me that ample time should be allowed for the transition; in fact, a period of not less than two or three years.

While I have never regarded the measures of length of the metric system as the most ideal for practical purposes, still no better system exists, and it is decidedly too late to devise any new systems. I hope the National Government will soon enact such laws as will insure the ultimate adoption of the metric system as our standard.

I may add, in conclusion, that I have been in consultation with most of the heads of departments and engineers of the General Electric Co., and find that on the whole they are favorable to the adoption of the metric system, especially on new work, with the idea that it would eventually entirely displace existing measures. When it is borne in mind that in the business of machine manufacturing, the cost of gauges and other tools made in standard dimensions is a large item, and that the change means the production of other gauges, etc., in the new system, it is indeed surprising that so little opposition to the proposed change has arisen.

It is beginning to be generally believed, I think, that the ultimate advantage will be greater than the temporary disadvantage, and that the longer we go on without making the change, the more difficult and costly will the carrying out of any such substitution become. ELIHU THOMSON.

Bement, Miles & Co.

In the matter of adopting the metric system of weights and measures in the United States, our views upon the subject were not given upon first request, as we thought the matter required more consideration than we found time to give it, before placing ourselves upon record either for or against the change.

As the request has again been made for our opinion, can only say we give it from our point of view and in connection with our particular line of business. Were we to pass upon the simple question of the advisability of having a uniform standard throughout the civilized world, and without regard to the inconvenience and expense incidental to the change, we would decide in the affirmative. We would also be an advocate of adopting the metric system on account of it being more universally used than any one system, rather than to attempt to force the British standards, even though considered as convenient.

From what we have said thus far, you will see we are, in a general way, in favor of a common system of weights and measures, and the system should be the metric. On the other hand, considering the matter in connection with our own manufacture, or, to make it more definite, our manufacturing establishment, we do not believe the time is opportune for adopting this system, as it would lead to considerable expense if it were carried out to a degree that would make it an international benefit. We could readily, and without much expense, express dimensions of tools, fixtures, etc., in metric symbols, but would this be any real advantage unless the pieces so expressed were exact duplicates of similar pieces in use by countries whose standard is the metric system? Were the decimal system to be used, we would find it necessary, as a matter of economy and to be able to duplicate parts for repairs, to adhere to sizes now in use and merely express them differently. This sort of adopting the system would not, to our way of thinking, lead to the desired point.

To reach the object we are after, we would have to equip our places with new tools and fixtures that would be uniform in size as well as expression, among all nations using the metric system. This would mean, for many years, carrying a larger stock of tools, and of course increasing the investment without a corresponding increase in the output.

Considering the many exports made to countries where the metric system is in use, we have found it necessary in very few instances to conform to metric sizes, and in fact, only in such machines as lathes where the lead screw had to be a decimal pitch. These modifications were readily made, and the balance of the machines made to our ordinary standard.

As we think the change would increase the expense and create more or less confusion, without materially increasing the sales, it is a natural conclusion that we would not favor the change until convinced the view taken by us is wrong.

W. J. HAGMAN, General Manager.

William Sellers & Co., Incorporated.

By "adoption" I understand is meant enforced adoption by legislative enactment, and presume that this question, which has been forced into prominence at intervals during the past century, is again re-opened because Congress is considering a bill designed with this intent.

I have not seen the text of this measure, but understand it requires all departments of the general Government to use the French metric system except for land measurement, the expectation being, doubtless, that the resulting inconvenience to those dealing with the Government will tend to bring the French system into more general use.

I do not think any great hardship would be involved if the Government should require the army and navy stores—the coal, salt pork, hard tack, molasses, etc.—to be measured in kilograms and liters instead of pounds and gallons, although I confess I do not see any particular advantage in such a course; but before forcing this change on all departments, I think the cost, direct and indirect, should be carefully considered.

The Government is a large buyer of many kinds of manufactured products, and, in order to buy at reasonable rates, must buy what the market supplies; that is, must use what other purchasers require. For example, we have certain standard sizes of pipes and fittings threaded with so many turns per inch; these are well recognized, and we are able to buy pipe of one man and valves or other fittings of another man with reasonable certainty that they will fit one another, and many expensive tools and gauges are required to produce this degree of uniformity. Is it intended to forbid the Government to buy such pipe and fittings and require it to have made special pipes in millimeter sizes with threads in millimeter pitches? It is hardly conceivable that any one understanding the subject should recommend such a course.

The case is the same with our convenient series of bar sizes, our sheet and wire gauges, our bolts, nuts and screws and many other commercial standards in all branches of business. It is true that these conventional sizes are perhaps more or less crude and imperfect; but they are well understood and serve their purpose, and experience has shown how difficult it is to change them when better series have been suggested. It is said that we need not change any actual sizes, but simply call them by new names. For years we have been trying to increase the accuracy of the sizes of things—to have the inch bar or the inch bolt measure 1 inch in diameter and not more or less; but if we must call our 1-inch bar a 25 mm. bar, which it is not, it seems to me we are retrograding instead of progressing.

The great convenience that was expected from the decimal division of measures has proved largely a delusion, and it is admittedly impracticable to overcome entirely the natural tendency to binary division. It is admittedly impracticable to change our land measures and I believe equally impracticable to change our land measures and I believe equally impractic-

able to abandon our pipe and screw-threads, our wire gauges and many other standards, as well as the vast amount of engineering data now stated in our present units. I cannot see that anything is possible but a partial introduction of the French system amounting certainly at first to a mere change of names.

If any one now desires to adopt or use all or any part of the French system he is at perfect liberty to do so. The Government has already legalized the French units and has moreover provided standards of weight and measurement to which all may refer. In my judgment the general Government has thus done its whole duty in the premises. I am not an advocate of that kind of despotic paternalism which interferes too much with the private affairs of the citizen. The French system has been gladly adopted in the laboratories of scientific men, and its further general adoption will proceed as rapidly and to the extent that the system proves itself better or more convenient in any way than the simplified English system which we now employ. It appears, however, that the advocates of the French system are not satisfied with the natural process of extension and therefore seek to bring about the general use of the system by legal coercion in the absence of any demand for such legislation from the people at large.

I believe that without a popular demand for such a change, any attempt to force the French system into use by legal coercion will prove largely abortive. C. SELLERS, JR.

Mineral Products of the U. S. in 1901.

The United States geological survey has issued its annual statistical summary of the mineral products of the United States for the calendar year 1901. It shows for the entire country a grand total of $1,092,234,390 as the value of minerals produced in 1901, as against $1,064,408,321 in 1900. This comprises $566,351,090 worth of non-metallic mineral products, $524,873,284 metallic products, and $1,000,000 (estimated) of mineral products unspecified. The value of the pig iron is placed at $242,172,000; chromic iron ore, $5,790; limestone for iron flux, $4,659,836; manganese ore $116,722.

Large Iron Ore Purchase in Utah.

P. L. Kimberly, of Chicago, and F. H. Buhl, of Sharon, Pa., have made a very extensive investment in iron ore property in Iron county, Utah. The property purchased consists of six groups comprising about 120 locations. The consideration is said to have been $2,250,000. In response to an inquiry, *The Iron Trade Review* is advised that Messrs. Kimberly and Buhl have bought what they think is an immense body of ore in Utah, but as yet have no definite plans. It is their intention to explore the property fully, but further developments are to be determined. The purchase includes the greater portion of the iron ore in Iron County.

The Roanoke furnace at Roanoke, Va., was sold by order of the United States commissioner of bankruptcy to Judge A. A. Phlegar, of Christiansburg, Va., for $125,000. The furnace was built in 1890 and has an annual capacity of 48,000 gross tons. The rolling mill of the Roanoke Iron Works, which has an annual capacity of 21,000 gross tons, was sold to James P. Woods, of Roanoke. The furnace and rolling mill were afterwards sold as a whole to Donald MacLeod, of Philadelphia, for $170,000. Drake, Barton & Co., Cleveland, recently offered $125,000 for the property.

"The Cost of Production" is the title of a book containing 64 5x7¾ pages, written by Charles J. Watts. The descriptive matter and illustrations are taken from the author's experience in the manufacture of agricultural implements. The methods are equally applicable to any factory by the substitution of the different terms and units for those given in the book. The work may well serve as an exposition of the use of the card index in handling records of the consumption of material and labor, together with the operating expenses of the factory, and the little treatise submits a complete and concise system in this connection. It is published by the Shaw-Walker Co., of Muskegon, Mich. Price $1.

PERSONAL.

Samuel P. Woodside, for the past 15 years general agent of the Erie Railroad with headquarters in Pittsburg, has resigned to accept the position of general traffic manager of the Pittsburg Coal Co., of Pittsburg. He succeeds H. J. Lawrence, resigned.

R. D. Hunter, manager of the Denver, Col., office of the Sullivan Machinery Co., of Chicago, has sailed for South Africa with a view of securing contracts for mining machinery in that country.

Charles J. Parkes, formerly connected with the American Steel Hoop Co., at Youngstown, O., has accepted the position of superintendent of the 8-inch continuous guide mill now in course of erection at the Brown-Bonnell plant of the Republic Iron & Steel Co., Youngstown, O.

John D. Nicholson, vice president and treasurer of the Pittsburg Coal Co., returned to Pittsburg last week from a trip to Europe.

Hugh Kennedy, of Pittsburg, who recently resigned as manager of the blast furnace department of the American Steel Hoop Co., left last week for Buffalo, N. Y., to assume charge of the furnaces of the Buffalo & Susquehanna Iron Co., under erection there. He was appointed to this position some time ago.

L. W. Powell, of Duluth, has been appointed assistant to President Thos. F. Cole, of the United States Steel Corporation's iron mining companies.

James A. Mathews, formerly manager of the Crescent Tin-Plate Co., has become manager of the real estate department of the Guardian Trust Co., Cleveland.

B. Crowell, of the firm of Crowell & Peck, Cleveland, is on a three weeks' trip examining mining properties in the Lake Superior region.

T. R. Morgan, of the Wellman-Seaver-Morgan Engineering Co., returns this week from a European trip.

Obituary.

The late Senator James McMillan, of Michigan, who died at Manchester, Mass., Sunday, had for many years been identified with important industries of the great lakes. Among the more important corporations in which he held stock are the Michigan Malleable Iron Works, the Detroit Railroad Elevator Co., the Detroit Union Station Co., the Fulton Iron & Engine Works, the Detroit Iron Furnace Co., the Seamless Steel Tubes Co., the Buhl Malleable Co. He was a large stockholder in the Detroit & Buffalo and the Detroit & Cleveland line of steamers and was president of the latter line. Colors of all vessels on the great lakes are flying at half mast in honor of the late Senator.

James H. Denham, for 35 years foreman of Taplin, Rice & Co.'s foundries, Akron, O., died at his home in that city Aug. 9, aged 65 years.

Walter A. Scott, president of the Illinois Wire Co., was stabbed to death in his office in the Monadnock Building, Chicago, on Aug. 9, in an altercation with Walter L. Stebbins, a civil engineer.

Joseph Bond, president of the American Radiator Co., died at his home in Chicago, Aug. 8, of Bright's disease. He was born in Ware, Mass., in 1852, and went to Chicago in 1892. He was a trustee of the University of Chicago and a member of the Chicago Union League and other clubs.

T. A. Budd, of 610 Ellicott Square, N. Y., manufacturer's agent, who is well known in engineering circles in Western New York through his association with several prominent manufacturing and engineering concerns, has been appointed sole agent for Western New York for the We-Fu-Go and Scaife water softening and purifying systems which are manufactured by Wm. B. Scaife & Sons Co., of Pittsburg.

The *Marine Review* announces that with its next issue it will appear in conjunction with the *Marine Record*, these papers having been consolidated under the name of the *Marine Review and Marine Record*. The consolidated paper will be issued from the present offices of the Marine Review Publishing Co., Wade Bldg., Cleveland.

STEEL RAILS—STRUCTURE AND DURABILITY.

In *The Iron Trade Review* of July 24 was reprinted the paper of Robert Job, of Philadelphia, read before the Mining and Metallurgical Section of the Franklin Institute, on "Steel Rails: Relation Between Structure and Durability." From the *Journal* of the Franklin Institute we make the following extracts from the discussion:

JAMES E. YORK: The diagrams Mr. Job has presented are very instructive as showing what a remarkable effect the physical treatment has on the wearing qualities of a steel rail. The present method of manufacturing steel rails, with their enormous output today, has evidently resulted in deteriorating the durability of the rail as compared with the rails made in the sixties and seventies. This might in a measure be explained by the fact that the rails then were of lighter section than now, and consequently received greater physical reduction, and also permitted of finishing at a lower temperature than at the present time; but this does not explain why the so-called John Brown rails, of which Mr. Job gave us illustrations, have shown such marked superiority over those of recent date, as regards actual service in the track. To explain this superiority we have certainly to look to the physical treatment of the rails. It may be of interest if I read what Mr. Robert W. Hunt writes in *Cassier's Magazine* on the chemical composition of the John Brown rails:

"The carbon varied from 0.24 percent to 0.70 percent; silicon from 0.032 percent to 0.306 percent; phosphorus from 0.077 percent to 0.156 percent; sulphur from 0.050 percent to 0.155 percent, and manganese from 0.312 percent to 1.046 percent."

The great divergence in chemical composition of the rails made at that period compared with modern practice makes it interesting to consider how these rails were then manufactured. In my own experience I remember that the rails between 1865 and 1870 were made by first casting a 14-inch ingot, of sufficient length and weight for three-rail lengths. These ingots were allowed to cool down and were then examined thoroughly for physical defects. After examination they were put into a heating furnace horizontally, and slowly brought up to the necessary temperature for manipulation, which consisted in bringing the ingot to the hammer and cutting it into three lengths. Two of the pieces were returned to the heating furnace for subsequent hammering, one piece being left for treatment at this initial heat. It was then hammered down to about 7 inches square and put on one side to cool, and again examined for any apparent surface defects. It was then carefully heated and to a lower heat than the primary heat, and rolled down into the finished rail. The reduction in rolling the rails was much lighter than in present practice, and consequently less severe on the structure of the material. This was necessary from the fact that the rolling mills of that period were much lighter, which necessitated lighter reduction. The rolls ran at much slower speed, permitting of the rolling at lower temperature, and the rails were, as Mr. Job has shown, satisfactory as regards wearing qualities. The output then was very small compared with that at present. It did not exceed 100 tons per day, whereas now 1,000 tons per day is not an unusual output. Then, too, these rails were sold at $100 or more per ton; hence this apparently costly method was considered justified at that period and in those circumstances.

A short time ago I read in the *Iron Age* that Mr. Martin, of the Maryland Steel Co., considered that the desirable temperature at which rails should be finished to secure the best results as regards the fining of the grain in the head of the rail, was in the neighborhood of 700° C. to 750° C. I am inclined to think that there are mechanical objections to finishing at this temperature by the present method of rolling, from the fact that the physical structure of the rolls themselves would not stand such hard usage, and would therefore necessitate frequent change of rolls. There are only two practical ways of physically fining the grain in steel mechanically; one is by hammering at comparatively low temperature and the other is by rolling at low temperature. The effects of cold-rolling have been clearly and practically shown by the experience of Jones & Laughlins in cold rolled shafting, in which the tenacity, elasticity and resilience of steel is wonderfully increased, and this justifies my views on this matter, which are that it is necessary to finish rails in a specially constructed universal mill which permits of the use of chilled rolls—the only material in which steel, in any large quantity, can be rolled at any practical, desirable temperature. The present method of rolling is specially objectionable for rolling flange sections at a low temperature, from the fact that the difference in the delivery speed of the rolls on the various parts of the rail section makes it necessary that the temperature of the rail shall be such that the slower delivering parts can stretch or slip to accommodate themselves to the other parts of the section. Should this be attempted at a temperature of 700° C., the rail is liable to have permanent internal strains in the bar. This difficulty would be overcome by rolling universally, from the fact that every part of the bar is practically delivered at the same surface speed.

Mr. Martin said, in regard to Mr. York's statement, that what he (Martin) had written was that he considered 750° C. a desirable temperature, and not that he had actually finished rails at that temperature. Mr. York explained: "I intended to say, Mr. Martin, that the temperature of 750° C. was what you considered desirable, and not that you had actually finished at that temperature." Mr. Martin continued: "As to rolling at temperatures given, I wish to explain that these were obtained by the use of the water calorimeter, and this calorimeter checked with Le Chatelier pyrometer, and would say we obtained temperatures as given, and get very good tonnages off sand rolls. We nevertheless use some chilled rolls, as he suggested should be done, and I know of other mills that use chilled rolls exclusively with results only slightly better than off sand rolls; and as with chilled rolls for rails, the tendency is for the deep collars to part from the body of the roll, on account of the unequal expansion of collar and body of roll, so much more so than with sand rolls.

P. H. Dudley, after referring to the photographs of sections of rails as seen under the microscope [reproduced in our issue of July 24], commented as follows: "I have never been able to obtain a similar structure to that shown in Fig. 6 from any of our modern rails, even when rolled down to small sections until the rails were barely red. Some of the specimens from older rails which were hammered have shown nearly a similar structure. The rails from the hammered blooms had from 18 to 20 passes in the different trains before the rail was finished; each reduction was very light and the trains were run at moderate speeds. The capacity of the mills averaged from 60,000 to 70,000 tons per year. Those rails which were imported cost from $120 to $140 per ton in gold, and while they have rendered exceptionally good wear, the small mechanical element of stiffness of the sections compared to their weight only enabled very light axle loads to be carried over them. The number of cross-ties which those rails have required would more than have covered the cost of stiffer rails, and while they could be used in yards where the train movement was very slow, yet out on the main line they have long been too light to be economical.

"As to the influence of mill methods upon the size of grain, a number of observations have been recently made on the rails rolled by holding before the finishing pass, which show more reduction in structure than is indicated by even Fig. 5. The comparative wear must be ascertained by actual service. The steel in the modern rails is now of much greater tensile strength and higher elastic limits than in the rails which were rolled twenty-five and thirty years ago. The higher physical properties can be obtained by proper care without producing brittleness. The form of the sections now is much better adapted to the higher physical properties of the steel than those formerly in use. Their fracture in the track is not nearly so dangerous as in the lighter sections.

"Fig. 8 represents structure at center of head of rail which has stood the drop-test, while Fig. 10 represents structure of a section of the same rail which has been reheated to cherry red and let cool at once in the air. The tensile strength is increased apparently 1,100 pounds per square inch, while the elongation and reduction of area have also increased. Such rails ought to give an increased wear from the fact that the mineral aggregates are so much smaller than the coarser grains shown in Figs. 1 and 8. As a girder we depend upon the linear elongation for the modulus of elasticity, while for sustaining the wheel loads upon the surface of the girder we

depend more upon the cubic elasticity, or elasticity of volume.

"The small grains have a higher cubic elasticity than the coarser grains, the latter failing directly by shearing under the wheel contacts. That foreign matter in steel lowers the tensile strength, elongation and reduction of area, and in addition tends to brittleness, and that when present in fair excess with high finishing temperature it renders the rails fragile under the drop-test, is true without any question. The statement that the presence of a relatively large proportion of foreign matter may not produce brittleness, provided the grain of the steel in fine, is true, so far as the longitudinal elasticity is concerned, but for the cubic elasticity, foreign matter permits the head of the rail to crush and deteriorate rapidly under the wheel boads.

"In general it is true that to ensure the most desirable rail of a given composition, service tests prove that there must be absence of brittleness and freedom from foreign matter, and presence of fine granular structure. Absence of brittleness is indicated by ability to withstand the drop-test of 2,000 pounds falling 20 feet; that means that the section of rail must be able to take up 40,000 foot-pounds of energy without fracture. This will produce a compression of the metal in the head for a limited length; also an extension of the metal in the base. With a section 5 inches high, a deflection with decided elastic reaction will be produced. If the supports are 3 feet apart, the permanent set for a high-grade rail will be from 1¼ to 2 inches. The metal in the head of the rail directly under the drop will have a maximum compression of 5 to 6 percent, and the metal in the base of the rail will have a maximum extension of 5 to 6 percent. The metal in the head of the rail will be compressed for a length of 10 to 12 inches, and the base of the rail will be extended for 10 to 12 inches. The width of the head will be widened, while that of the base will be narrowed and thinned down. If the rail is 6 inches in depth, then the same energy, while it will produce almost the same extension or compression of the metal per inch, does not produce as great deflection, the permanent set being about one-half that of the 5-inch section for the same high grade of steel.

"On the hypothesis that fine granular structure is ensured by stipulating that the temperature of the ingot or bloom shall be such that with rapid rolling, and without holding before or in the finishing passes or subsequently, and without artificial cooling after the last pass, the distance between hot saws shall not exceed 30 feet 5½ inches for a 30-foot rail (90 pounds), or a proportionate distance for other lengths, it does not appear that Mr. Job has given sufficient consideration to the increased speed and reduction, nor the number of heat units to be dissipated in the large ingots at present in use as compared to the smaller ingots, slower train speeds, lighter reductions, less number of heat units, of the early steel rails. While the cooler rolling of the metal will improve the quality, it is not all that is required to make good rails for present service. It has now been found by examination, that with the great reduction in the passes and rapid rolling, the metal is often injured and partially separated, so that it develops a weakness afterwards in the finished rail, the ingots having been perfectly sound before rolling."

Wm. Kent:—The older members of the Institute of Mining Engineers remember the famous discussions over twenty years ago on the papers of Dr. Chas. B. Dudley, on the wearing power of steel rails. In these papers it was attempted to show what was the relation of the wearing power to the chemical composition and to the physical properties as far as the latter could be determined by the ordinary testing machines. The results of the discussion left the problem an unsolved one, but they showed that the wearing power must depend on something besides the chemical composition—something of which nothing was definitely known at that time. Twenty years ago we knew practically nothing about the microstructure of steel, or about the effect of heat treatment on that structure. Meantime, the manufacture of rails has developed by a tentative method. It has been found necessary to raise the carbon as the weight of the rail has increased, and something has been learned in regard to the amount of work that should be put on an ingot and the temperature at which it should be finished. Mr. Job's paper is the first attempt in over twenty years to put our knowledge of the subject on a scientific basis. It shows not only the relation of wearing power to microstructure, but also how the most desirable microstructure may be obtained. Mr. Job is to be congratulated upon his most important scientific research and upon his having laid the foundation for much further research in the same direction.

Mr. Job:—Regarding Mr. York's remarks concerning the cause of the durability of the old rails of light section, it has been previously stated that the process then in vogue necessitated thorough working of the steel well down toward the critical temperature. This resulted in very fine-grained structure, and as a consequence the ductility was far greater than is attained in the practice of today with the same composition and the same weight of section, but when the thorough working of the steel is stopped at a higher temperature. We have seen that the fining of the grain has resulted in a marked increase in ductility and reduction of area, with increased strength, and, as has been shown, we know from service results that such changes with any given composition result in greater durability in actual track service. Thus, the cause of the superiority of the old rails is fully accounted for by the betterments shown in their physical qualities.

In Mr. P. H. Dudley's interesting discussion it is noted that sufficient consideration does not appear to have been given to the increased speed and other conditions of present mill practice, and that, while the cooler rolling of the metal will improve the quality, it is not all that is required to make good rails for present service, since the metal may be injured and partially separated by great reduction in the passes. In the paper I have stated that fine granular form is greatly desired, but that this is only one of several essentials required to effect durability in service. In the cases of separation of the metal mentioned, brittleness would result and would be detected by the drop-test. It is understood that proper mill methods shall be used throughout the process of manufacture, and where this is done we do not find evidences of brittleness.

Labor Cost on the Mesabi Range.

The following statement of the labor cost of operations at underground and open pit properties of the United States Steel Corporation on the Mesabi Range, in the first nine months of 1901, will be found interesting. The tables also show the daily output of ore per man:

UNDERGROUND MINES

January 1 to October 1, 1901.

Mine.	Tons per Man per Day.		Average Daily Wages.	
	Mine Labor.	Total Labor.	Mine Labor.	Total Labor.
Adams	5 32	4 09	$2 23	$2 20
Spruce	4.80	4.02	2 26	2 27
Hull	6.01	4.71	2 36	2 27
Rust	6 05	4.98	2 13	2 09
Burt	8.16	5.23	2 17	2 20
Pillsbury	6.48	5.00	2 33	2 25
Genoa	6 03	4.81	2 19	2 21
	6 12	4 69	$2 24	$2 21

OPEN PIT MINES.

May 1 to October 1, 1901.

Mine.	Tons per Man per Day.		Average Daily Wages.	
	Mine Labor.	Total Labor.	Mine Labor.	Total Labor.
Mountain Iron	40 28	32.37	$2 07	$2 12
Auburn	26.09	20.13	2 17	2 15
*Fayal	25 65	21.44	2 08	2 18
Duluth	16 00	12.39	2 04	2 04
	27.01	21.53	$2 09	$2 12

*For July and August. Started in July to separate underground and open pit costs.

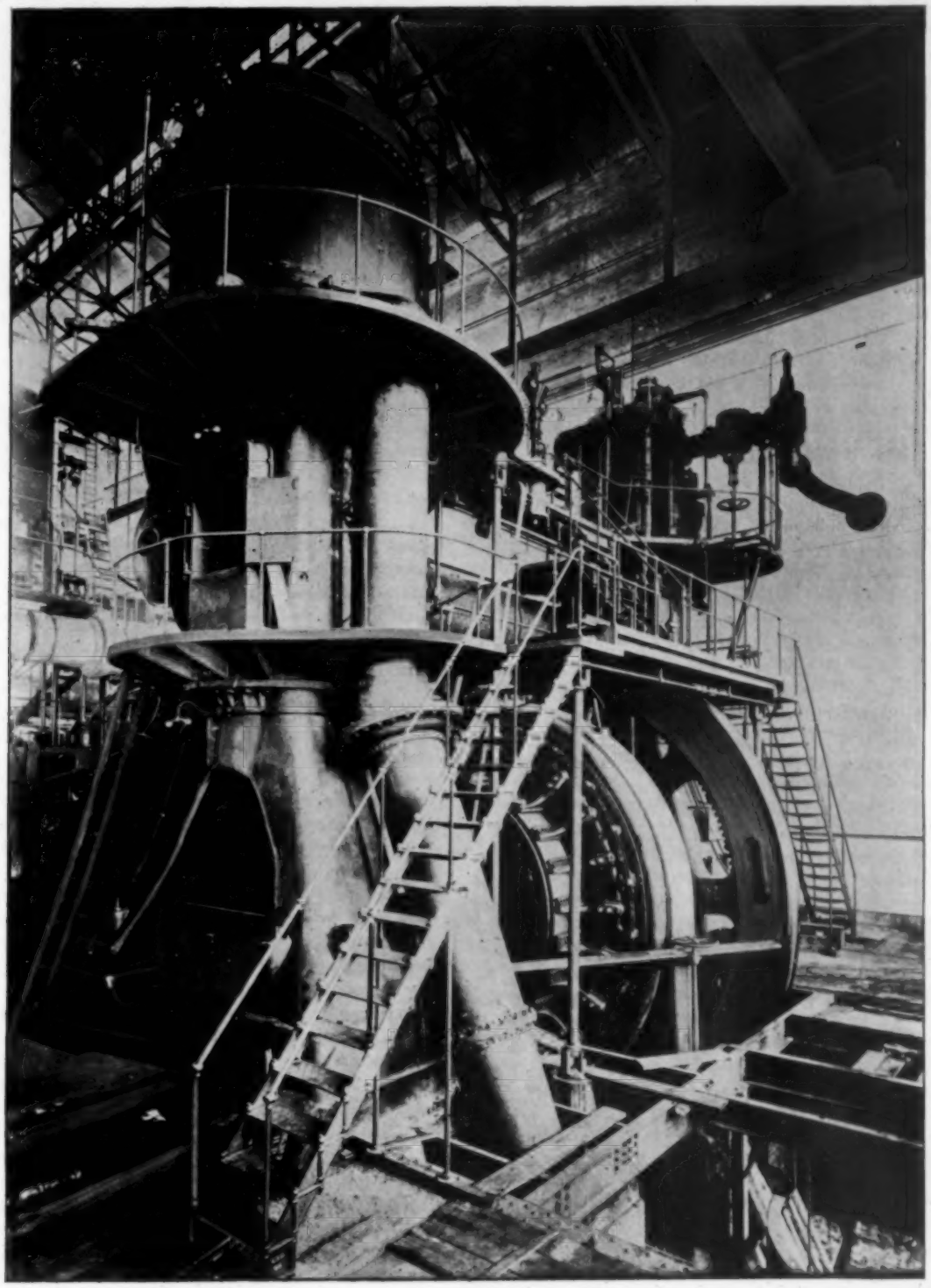
The plant of the Griffin Wheel Co., South Tacoma, Wash. has resumed operations after an idleness of nearly one year.

Preparations are now being made to dismantle the plant of the Canton Crucible Steel Co., Canton, O. The control of the plant passed into the hands of Pittsburg stockholders some time ago, but, as it was found that operations could not be carried on profitably, the Pittsburg stockholders have decided that it would be best to dismantle the plant and remove the machinery to a new site to be obtained in the Pittsburg district where a larger and better appointed plant can be erected.

AN ELEVATED RAILWAY POWER STATION.

The Lincoln station of the Boston Elevated Railway differs in many respects from the various other power stations of the same railway system. It is the most recent addition to Boston's numerous electrical power plants and is located on the lot known for many years as Lincoln Wharf, where there are excellent facilities for the docking of coal and other supplies.

The boiler installation consists of eight 468-h. p. and four 490-h. p. Babcock and Wilcox boilers. An equipment of Roney mechanical stokers of the same type as those in the large power houses in New York city has been installed by Westinghouse, Church, Kerr & Co. Coal will be automatically unloaded from vessels and stored in a large pocket holding 5,000 tons, with a further storage bin of 3,000 tons in the boiler house, or a total storage capacity of 8,000 tons. It is



4,500 H. P. WESTINGHOUSE VERTICAL COMPOUND ENGINE DIRECT CONNECTED TO 2,700 K. W. DIRECT CURRENT WESTINGHOUSE GENERATOR.

The massive chimney, extending to a height of 250 feet, and one of the first things to catch the eye, is said to be the tallest stack in the city. The building is divided into two longitudinal sections, the boiler room and all apparatus pertaining thereto being in one section and the engines, generators and condensing system in the other. The engine room is served by a large electric crane of 40 tons capacity. The walls of this room are faced with white enamel brick.

The present station contains three units aggregating about 13,500 h. p. Ground area has been provided for extensions, permitting an ultimate equipment of about 30,000 h. p.

carried to the boilers by a Hunt conveying system which conducts the coal into overhead conveyors leading to the stokers, thus practically eliminating all manual labor in the handling of coal and ashes. The apparatus is so arranged that coal can be taken from the pocket to the storage bin in the boiler house, and tracks are located on either side so that cars can be automatically loaded to carry coal to the various other stations if desirable, viz., to the Charlestown, Harvard, Allston, and Central Stations, as well as to some 30 or more car houses situated in different parts of the city. The plant is equipped with Green economizers.

Feed water is supplied to the boilers by means of two vertical compound pumps manufactured by the George F. Blake Mfg. Co. A Star vacuum feed water heater of 8,000 h. p. capacity is placed on the base of the chimney conveniently near the feed pumps. As the smoke flues from the boilers enter the stack at a point some 30 feet from the boiler room floor, the space in the lower part of the stack has been found quite valuable for the location of such auxiliaries as feed water heaters, receiver of the Holly gravity return system and sundry piping.

The original engine installation consisted of two vertical cross-compound units of 4,500 h. p. each, built by the Providence Engineering Co. The generators and flywheels are carried on the shafts between the high pressure and low pressure sides. The generators are direct current machines, rated at 2,700 k. w. each. A third unit, which has just been completed, consists of a vertical cross-compound engine of about 4,500 h. p., designed and built by the Westinghouse Machine Co. and installed by Westinghouse, Church, Kerr & Co. It is of the same design as the one recently furnished for the Charlestown power station and is direct connected to a Westinghouse direct current generator of 2,700 k. w. capacity of the same make and similar to one of the two machines mentioned above. The engine, however, differs considerably in design and construction from the two engines first installed. The high pressure cylinder is fitted with poppet valves for use with superheated steam, which is supplied by superheaters built by the Babcock & Wilcox Co.

Steam is conveyed from both sides of the boiler room by 8-inch mains to a 16-inch drum, from which it is conducted by 12-inch risers to Cochrane receiver separators and thence to the engines. All the live steam drips from steam drums, separators and reheating receivers are carried back to the boilers by the steam loop and Holly gravity return system.

Ingersoll-Sergeant air compressors, each driven by a 50-h. p. Westinghouse, 500-volt motor, supply compressed air for the block signal and switching system, used by this road. Early in the conception of the scheme of running trains at high speed under the rather complex conditions here existing, the engineers of the Boston Elevated Railway realized that a block system was necessary as a safeguard against accident. After careful consideration the Westinghouse electro-pneumatic interlocking system, manufactured by the Union Switch & Signal Co., of Swissvale, Pa., was chosen.

The elevated road includes some 14 miles of trackage. The switches and signals are controlled from four switch towers and the automatic block signals are located at distances of about 800 feet apart. Each tower is supplied with indicators showing the approach of trains. The towers at the junctions of the Atlantic circuit and main line control some 1,200 elevated trains daily. The largest tower is located at the Sullivan Square terminal where some 500 elevated trains and 700 surface cars pass in and out daily, involving 6,000 switch and signal movements. A force of only two men on duty is required to operate the switchboard mechanism, consisting of 35 pneumatic levers. The terminals are also supplied with lamp indicators, showing the relative location of approaching trains.

The International Convention of the Coremakers' Union of North America will be held at Cincinnati, O., the week beginning Monday, Sept. 8.

The Tennessee Coal, Iron & Railroad Co. has decided not to close the deal for the sale of the Oxmoor furnaces to the Oxmoor Furnace Co. It is probable that the Tennessee company will operate the furnaces and will shortly make repairs with that in view.

Work on the erection of the open-hearth plant and rolling mill of the American Tube & Stamping Co., at Bridgeport, Conn., is progressing rapidly and the two main buildings are already nearing completion.

The Old Dominion Iron and Nail Works, Richmond, Va., has resumed operations after an idleness of several months. Extensive repairs have been made.

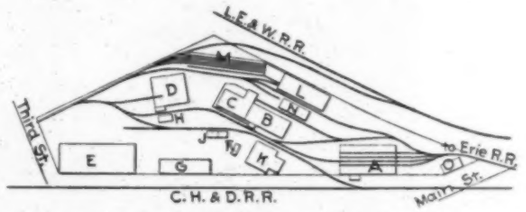
WORKS OF THE LIMA LOCOMOTIVE & MACHINE CO.

From a description of the new locomotive works at Lima, O., appearing in the *Engineering News*, we take the following as to the arrangement of the machine shop, foundry, boiler shop and other departments and their equipment:

The plant which is now under construction, covers about 15 acres. The capacity will be about one engine a day, the engines varying from 10 to 140 tons in total weight. The several buildings are all connected by a system of standard-gauge tracks, to be operated by a Shay engine, and there are sidings leading to the tracks of the Erie Ry., the Cincinnati, Hamilton & Dayton Ry. and the Lake Erie & Western Ry. There are complete systems of sewerage, water supply, electricity and fuel gas, and the buildings are heated by hot air delivered by a blower system, which is furnished by the New York Blower Co. The buildings were designed by the Osborn Engineering Co., of Cleveland, O., which company is also superintending the construction.

The machine and erecting shop, A, is 120x220 feet, with brick walls, steel roof trusses and a tile roof. The first floor is paved with concrete, and the second floor (in the side bays) is of slow-burning construction. The middle span is 60 feet wide, with a height of 38 feet to the rails of the two traveling cranes. This is the erecting shop, and has four tracks running its full length, with capacity sufficient for 20 locomotives. On each side is a two-story bay 30 feet wide, in which are the machine tools and other appliances.

The blacksmith shop, B, is 74x165 feet, built of brick, with



PLAN OF NEW WORKS OF THE LIMA LOCOMOTIVE & MACHINE CO., LIMA, O.

a slate roof. It is equipped with oil and gas furnaces, forges, forging machines, steam hammers, etc. Adjoining this is the frame and truck shop, C, 74x125 feet, containing wheel-boring machines, wheel presses, axle lathes, special drills for arch bars, punches, cut-off saws, etc.

The boiler shop, D, is 120x140 feet, of steel frame construction, with brick walls and a tile roof. It has a center span of 60 feet, and two side spans of 30 feet. At one end is the erecting tower, with hydraulic riveter. A 15-ton electric crane serves the 60-foot floor, while the side bays have several smaller traveling cranes. All the tools are driven by electricity. The large tools, bending rolls, punches, etc., have direct-connected individual motors, while the smaller tools are belted to a shaft driven by a motor. The hydraulic power for the flanging presses, etc., is transmitted from an accumulator in the power house.

The iron and steel foundry, E, is 300x120 feet, of similar construction to the boiler shop. It has the same cross-section, with an electric crane in the 60-foot middle span, and smaller traveling cranes in the 30-foot side spans. The cupolas for iron and converters for steel are in one side bay, near the middle; the core ovens, drying ovens and annealing furnaces for steel castings are in the same bay. The middle span and the other side bay are used for molding and pouring floors, all the materials for these being stored in sheds at the side of the building, so as to reduce the cost of handling. The brass foundry, F, is a brick building, 43x22 feet, with slate roof. The pattern-storage building, G, is 200x60 feet, with brick walls, steel roof trusses and tile roof. It is lighted entirely by roof skylights. Patterns will be carefully classified and indexed. The building, H, 60x125 feet, is for storing patterns, etc., which are not in constant use. At J are the sand and coke bins, 20x80 feet.

The building, K, is a frame structure, 93x100 feet, in which iron and steel castings are stored and classified, as a large stock will be kept on hand. This building has railway tracks

inside, and is served by several cranes. The planing mill and woodworking department are contained in a brick building, L, 70x200 feet, with slate roof. This is fitted with an exhaust system for removing dust and shavings. Beyond this is a storage building, M, 70x323 feet, having four railway tracks. This building has a wooden frame, with corrugated iron sides and roof.

The power house, N, is a brick building, 40x117 feet, with tile roof and cement floors. Two Scotch marine boilers of 250-h. p., with Morison corrugated furnaces, supply steam for an engine of 450-h. p. This drives two Sprague generators of 100-k. w. capacity, furnishing current for power and lighting. The air compressor, the blowing engine for the steel converters and the hydraulic plant for the flanging presses and riveting machines in the boiler shop are located in the power house. Finally, there is a three-story brick office building, O, 40x80 feet, which contains the several offices and the drafting department.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Wilcox Novelty Co., Jersey City, N. J., has been incorporated with a capital of $6,000 to manufacture hardware.

The Elyria Iron & Steel Co., of Elyria, O., capital $300,000, has been incorporated by W. E. Miller, W. S. Miller, W. E. Brooks, E. G. Johnson and E. K. Mussey. Buildings will be erected for the manufacture of steel tubing.

Ralph Christie and Roger Clay, of Cedar Falls, Ia., have formed a partnership for the manufacture of gasoline engines.

The Hardie Co., of Canton, St. Lawrence county, N. Y., has been incorporated to manufacture machinery. Capital, $5,000.

The United Building & Foundry Supply Co., Camden, N. J., has been incorporated with a capital of $250,000.

The Buffalo Machine Works, San Francisco, have been incorporated with a capital of $10,000, and with James G. Grannis, Wm. E. Cumback, Abram Bower, Samuel F. Keith and Elizabeth G. Bower, of San Francisco, as directors.

The Libby Engineering & Construction Co., Toledo, O., has been organized with a capital of $300,000.

The Bennis Stoker Syndicate, of New York City, has been incorporated with a capital of $5,000 to manufacture stokers' machinery.

The Peck Williamson Foundry Co., of Wellston, O., capital stock, $50,000, has been incorporated by George W. Peck, A. J. De Camp, A. W. Williamson, W. C. Williamson, and John K. Peck.

The Ridgway Machine Tool Co., of Ridgway, Pa., recently incorporated with a capital of $300,000 to manufacture lathes, planers and boring mills, will have a plant consisting of the following buildings: Machine shop, 112½x225 feet, erecting shop 75x225 feet, foundry 112½x150 feet, pattern building 75x150 feet, heating room 37½37½ feet, power house 37½x75 feet, all of the buildings to be brick and steel. The company has foundation in for the pattern building and commenced brick work on it this week. On account of delay in getting steel for all buildings, except pattern, the company will get only foundations in this fall and be ready for steel about March 1, 1903. It is the intention to use the pattern building temporarily to construct all machines for use in the shops. When in operation the company will manufacture boring mills up to 125 inches. All tools manufactured will be of large pattern. The engineer and designer is Mr. C. M. Conradson.

Gustafson Bros. Mfg. Co., Chattanooga, Tenn., wants double-end axle lathe for 2-inch axles (mining car), double-end axle lathe for 4-inch axles (incline car), boring and facing mill for car wheels, pulleys, cylinders, etc., turret lathe, each for finishing 1, 2 and 4 inches.

The organization of the Valley Iron Co., of Chattanooga, Tenn., with a capital of $1,000,000, was perfected at Sulphur Springs, Ga., last week. As previously noted in these columns the new company will develop coal, iron ore and limestone property located in the central portion of the mineral district on the Alabama-Georgia line near Nixon Station. A blast furnace is also to be built. James Bowron has been elected president; G. B. McCormack, vice president, and Erskine Ramsey, secretary and treasurer.

The Pokegama Co., of Duluth, Minn., has been incorporated with $10,000 capital for the purpose of developing iron ore properties. N. B. Merritt, T. A. Merritt and N. M. Smart, all of Detroit, are the incorporators.

The Frog Mountain Ore Co., of New York, has been incorporated with $40,000 capital for the purpose of dealing in iron ores. Archer Brown, L. N. Gross and G. B. Plant, all of New York City, are the incorporators.

The Cardella Self-Acting Pump Co., Ltd., of Battle Creek, Mich., has been incorporated with $250,000 capital for the purpose of manufacturing a patented self-acting pump. A plant 100x50 feet will be erected by the company immediately. Officers have been elected as follows: Chairman, Alexander S. Cardella; Wesley Leasor, vice chairman; Joseph L. Hooper, secretary; A. M. Slay, treasurer, and E. J. Hooper, director.

The James A. Spargo Wire Co., of East Rome, N. Y., has been incorporated with $30,000 capital for the purpose of operating a wire drawing plant. Work on the new plant was commenced some time ago and it is now fast nearing completion. James A. Spargo, John Baynes, John T. Wiggins, W. J. Doyle, John E. Mason, Fred M. Schelley and John D. McMahon are the incorporators.

The American Frog & Switch Co., of Hamilton, O., has increased its capital stock from $125,000 to $200,000.

The Lamb Wire Fence Co., of Adrian, Mich., has increased its capital stock from $200,000 to $400,000. At the last annual meeting a dividend of 25 percent was declared.

The LaBelle Iron Co., Steubenville, O., has increased its capital stock from $3,000,000 to $4,000,000. The increased capitalization is to provide funds for the completion of the additions now under way.

The McQuatters Plumbing & Machine Co., of Hillsboro, O., has been incorporated with $12,000 capital for the purpose of manufacturing plumbing machinery. A. L. Lowery, W. R. Lang and A. J. McQuatters are the incorporators.

The Wabash Bridge & Iron Co., Wabash, Ind., has increased its capital stock to $100,000.

The Christiana Machine Co., of Lancaster, Pa., has been incorporated with $40,000 capital for the purpose of conducting a gray iron foundry. E. G. Broomell, S. E. Linton and E. A. Caruthers are the incorporators.

The Union Co. with principal office at 419 Market St., Camden, N. J., has been incorporated with a capital of $2,000,000 to manufacture iron, steel and glass. Incorporators, J. C. Bily, F. A. McKenry, R. T. Russell and F. W. Stonecipher.

The Pneumatic Co., with principal offices at 419 Market St., Camden, N. J., has been incorporated with a capital of $200,000 to manufacture generators.

The Locke Drill Co., principal office 259 Washington st., Jersey City, has been incorporated with a capital of $100,000 to manufacture drills.

The Bar Foundry Co., Chicago, has been incorporated with a capital of $15,000 to manufacture in steel and wood.

The Globe Foundry Co., Peoria, Ill., has been incorporated with a capital of $6,000 to do a general foundry and machine business.

M. Estey, of Owosso, Mich., head of the Estey Organ Co., and Kansas City capitalists have associated themselves to establish a rolling mill in Kansas City to employ 200 men by January, 1903. The company has been incorporated under the laws of Arizona and capitalized at $2,500,000. It will be known as the Safety Angle Bar & Railroad Supply Co. The buildings will cost $50,000.

The Lumberman's Tool Co., of Grand Rapids, Mich., has been incorporated with a capital of $50,000.

New Construction:—

The Sigourney Tool Co., Hartford, Conn., will erect a new three-story plant for the manufacture of its tools, which will be 200 feet long and 50 feet wide.

Contracts for the erection of the new plant of the Phoenix Iron Works, Portland, Ore., have already been awarded and the erection of the buildings will be hurried to completion. The foundry will be 100x50 feet; machine shop, two stories

high, 60x100 feet; pattern shop, 32x50 feet, two stories high and warehouse 25x50 feet.

The Alamo Mfg. Co., Hillsdale, Mich., will erect a two-story machine shop 60x200 feet.

The Thomas Devlin Mfg. Co. will erect a new foundry at Burlington, N. J., which will be 168 feet square.

Letson & Burpee, Seattle, Wash., are considering the erection of a foundry 90x300 feet.

The stoves of the furnaces at the Ohio Steel plant, Youngstown, O., are to be materially increased in size so that they will have an increased capacity of fully 35 percent. At present they are 85 feet high and additions 29 feet 8 inches will be built to their tops.

The Western Steel Car & Foundry Co., Hegewisch, Ill., will erect a wood car erecting shop 200x500 feet and a steel car shop 200x700 feet.

The S. Obermayer Co., Cincinnati, O., dealers in foundry supplies, have decided to increase the output of their facing plants fully 25 percent by the erection of a three-story plant, 60x90 feet, which will contain ten mills.

The plant of the Steel Car Forge Co., New Castle, Pa., is to be greatly increased in size and capacity by the erection of a large addition. The main mill building will be increased in length from 310 to 490 feet and the shipping department will be enlarged by the erection of an addition 100x60 feet. A large amount of new machinery will be installed in the main building addition.

The Sigourney Tool Co., of Hartford, Conn., has awarded a contract for a new factory building. The company recently erected a new boiler plant. A part of the new factory will be occupied by the Smyth Mfg. Co., which makes bookbinders' machinery.

The Craig Foundry Co., Toledo, O., is building an addition to its main foundry building.

Henry Steinbrenner, representing Mrs. Anna C. Minch, has closed a contract with the American Shipbuilding Co. for a steamer to be completed next July. The new boat will be 400 feet over all, 380 feet keel, 50 feet beam and 28 feet deep. She will have triple expansion engines, cylinders 22, 35 and 58 inches by 40-inch stroke. Steam will be furnished by three Scotch boilers 12 feet in diameter and 12 feet long, to be allowed 170 pounds working pressure. The new boat which will cost about $255,000 will be built at the Cleveland yard.

The Western Foundry Co., Chicago, will build a new machine shop 50x150 feet at Albany Ave. and West Twenty-fifth St.

The Burden Iron Co., Troy, N. Y., is making extensive improvements to its plant.

The Oil Well Supply Co., of Pittsburg, is receiving bids for the erection of machine shops at Boulder, Col., the shops to be used for making oil well machinery.

The Western Steel Car & Foundry Co., Chicago, has contracted for improvements to be made at the company's plant at Hegewisch, at a cost of $250,000. The new car shop, 200x700 feet will be the largest of its kind west of Pittsburg.

The Brown-Cochran Co., Lorain, O., will erect a new factory building, 60x150 feet, as an addition to the present plant. The company makes gas engines and refrigerating machinery.

The Grand Crossing Tack Co. has secured a permit to build a $50,000 furnace building, 100 by 180 feet, in connection with its present plant at 118th St. and Calumet river, Chicago.

The Bettendorf Metal Wheel Co., Springfield, O., is building an addition to its plant. It will be 250x175 feet, of brick with steel trusses and slate roof. Practically all the machinery used by this company is of special construction, of its own design and manufacture. This building will be ready for occupancy about Nov. 15, and will increase the capacity of the plant considerably. After making the addition the daily double turn capacity will be over 125 tons of finished product per day. The company's specialty is that of building metal wheels for manufacturers under contract or advance specifications in large quantities only. For fiscal year ending Aug. 1st, the company had the heaviest season's business in its history, and has practically six months of next year's capacity sold out under contract.

The contracts for the new plant of the Cleveland Pneumatic Tool Co. have been awarded to Messrs. J. A. Reaugh & Son, of Cleveland, O. It is expected to have the plant completed and ready for operation within 90 days. It will be equipped with the most modern machinery and appliances.

The Adamite Abrasive Co., of Valparaiso, Ind., has bought a site in North Tonawanda, N. Y., and will build a factory for the manufacture of emery wheels and other emery wares. The plant will be operated by electricity from Niagara Falls, supplied through the Tonawanda Power Co.

Fires and Accidents:—

The Wray-Austin machinery plant at Detroit was damaged by fire to the extent of $4,000.

The plant of the Erie Forge Co., Erie, Pa., was totally destroyed by fire August 6. Loss, $50,000 with $18,000 insurance. Preparations to rebuild have commenced.

The machine shop of John Mutch at Winnipeg, Manitoba, was damaged by fire to the extent of $4,000 August 4.

The Pittsburg District:—

Work on the erection of the two new blast furnaces at the Edgar Thomson plant of the Carnegie Steel Co., Braddock, Pa., is being rushed and the furnaces are fast nearing completion. Both stacks are now having their tops placed into position and the stoves for both are nearly completed.

The Buffalo & Susquehanna Iron Co., Buffalo, N. Y., last week awarded contracts for the erection of its two blast furnaces to the Riter-Conley Mfg. Co., of Pittsburg. The stacks will be 80 feet high and 22 feet at the bosh. Each furnace will also have four hot blast stoves.

The Union Steel Co., Donora, Pa., will place its second rod mill in operation some time this month, which will increase the daily capacity of rods to nearly 1,000 tons. Work on the erection of the open-hearth furnaces at Donora has already been commenced.

The capital stock of the Pope Tin Plate Co., of Pittsburg, has been increased from $500,000 to $750,000. The company's plant is located at Steubenville, O.

The new plant of the American Ax & Tool Co., at Glassport, Pa., was placed in operation last week. The plant is the largest of its kind in the country.

The Duquesne Construction Co., of Pittsburg, has been incorporated under the laws of the State of New Jersey with $100,000 capital. C. E. Gallagher, L. L. Satler, J. A. Langfitt, W. F. Wood and J. S. McNaugher are the incorporators. Offices have been opened in the Park building.

The Pitt Mfg. Co., of Pittsburg, has perfected its organization and nearly completed the installation of its equipment for the manufacture of metallic packing in the Imperial Power building. The company is capitalized at $20,000. Officers are as follows: Taylor Alderdice, president; William H. Latshaw, vice president; A. B. McVey, secretary; H. S. Evans, treasurer, and L. H. Martell, general manager.

The Crescent Steel Co., of Pittsburg, one of the constituent companies of the Crucible Steel Co. of America, will shortly be dissolved. As all of the stock of the company is held by the Crucible Steel Co. of America the dissolution will be merely a matter of form.

Shipments of ore from the Lake Superior mines of the Union Steel Co. are already being made to the company's plant, Donora, Pa. The furnaces have not yet been erected, but an effort will be made to lay in a large stock of ore in case operations at the furnaces should be commenced before the opening of the navigation season next year.

The new furnace the Alabama Consolidated Coal & Iron Co. is building at Gadsden, Ala., is alongside the present stack there. The height is 85 feet diameter of bosh, 18 feet 6 inches. The annual capacity will be about 75,000 long tons. The company will continue to make its "Etowah" brand of foundry pig iron. Work has begun on the new stack and it is hoped to complete it and put it in operation by Jan. 1, 1903. It is not definitely decided whether the old furnace will be overhauled and equipped for making iron after the new stack goes in, or whether it will be dismantled.

Contracts for the erection of the buildings for the new plant of the Follansbee Bros. Co., near Wellsburg, W. Va., have been awarded to the Fort Pitt Bridge Co., of Canonsburg, Pa. The Wheeling Mold & Foundry Co., Wheeling, W. Va., has received the contract for the installation of the tin plate and sheet mils.

Do You Want More Steam?

THERE is a way of increasing your steaming capacity without adding to the number of your boilers. A

Cochrane Feed-Water Heater

will give you more steam—as much as 20% more in some cases—if you are now using live steam injectors to feed your boilers, or if the temperature of your boiler feed is at present anywhere from 40° to 200°—assuming that you can give the heater exhaust steam to do the work. The Cochrane Heater accomplishes this by putting the feed-water into the boilers at practically the boiling point—which enables the boilers to make steaming easier, faster and in greater quantities.

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Our Catalogue 11-H should interest you.

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Clearfield and 17th Sts, PHILADELPHIA, PA.

STILWELL'S FEED WATER HEATER

USES EXHAUST STEAM TO HEAT AND PURIFY THE WATER FOR YOUR BOILER.

ITS USE INSURES CLEAN BOILERS, GREATER EFFICIENCY AND SMALLER FUEL BILLS.

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Coke Charcoal Roofing

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SHEET METAL STAMPING

DIFFICULT WORK A SPECIALTY

LARGE FACTORY FACILITIES

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IN COILS OR CUT TO LENGTHS

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WIRE STRAIGHTENED AND CUT TO LENGTHS.

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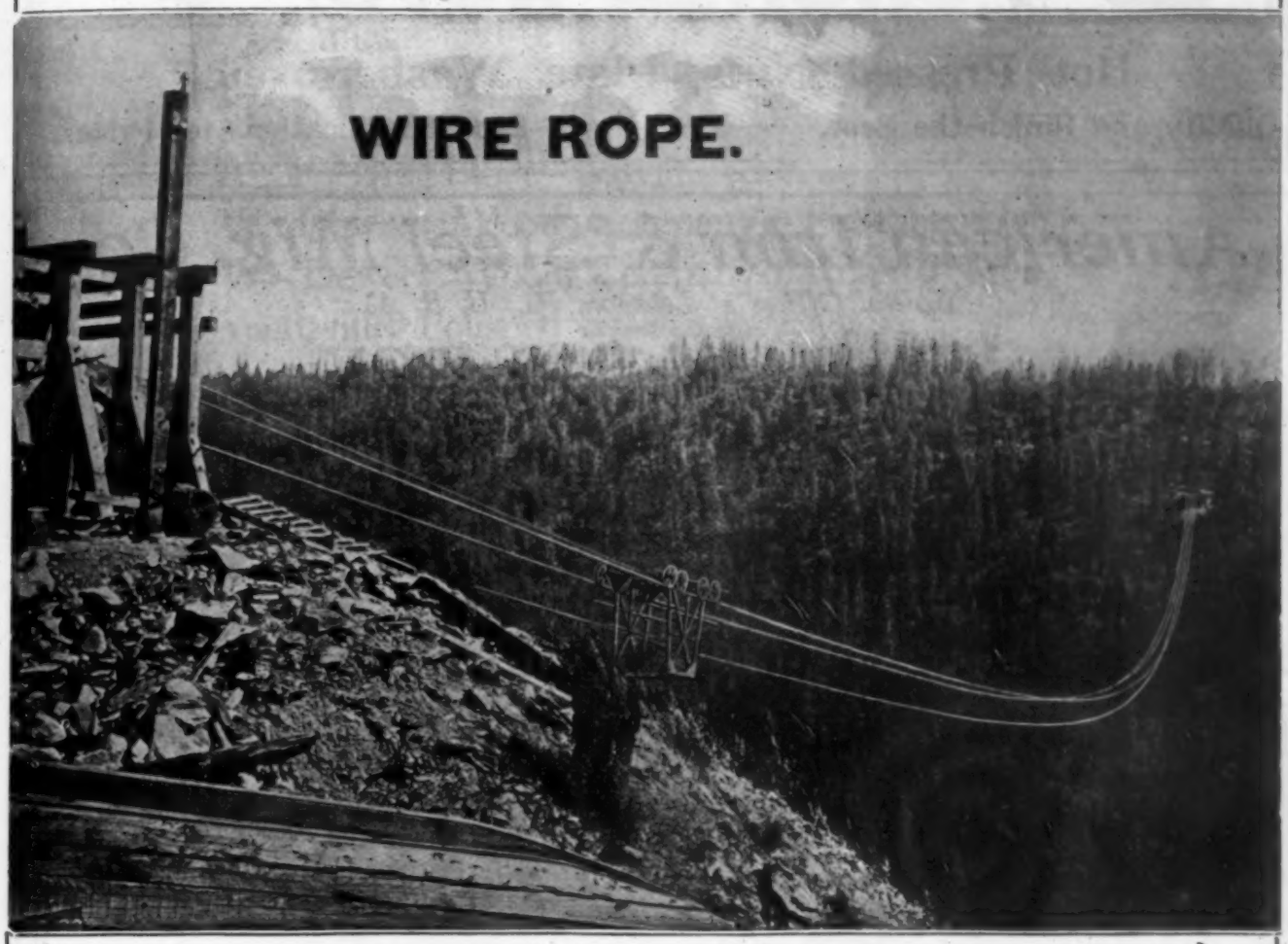

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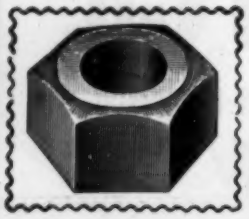

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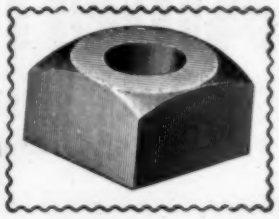

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Quality and Finish the Best. **Send Specifications for Prices.**

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(Annual Capacity AND STEEL about 150,000 Tons.)

Also Every Variety of

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MACHINE BOLTS, CARRIAGE BOLTS, GIMLET POINT COACH SCREWS, TURNBUCKLES.

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The entire tinning process is effected by skilled hand labor, without the use of acids or rolls. The very best plates, the greatest amount of pure tin and new lead, the utmost care in manufacture, successively contribute to making MF the best of all roofing. It is most economical, because it lasts longest—many roofs made of MF 50 years ago are sound as ever today. MF Roofing Tin is sold by dealers everywhere. Specify it in your building estimates. Ask your roofer,

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IT DOES if you use the ALUMINUM COATED.

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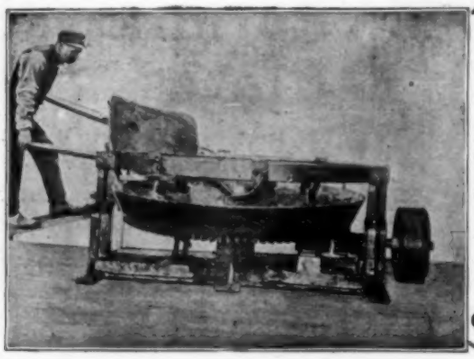

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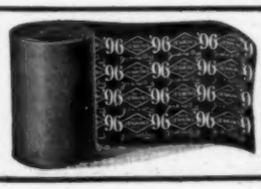

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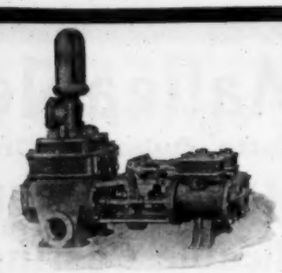
IF YOUR PUMP FREEZES UP



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AS REQUIRED FOR
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Perforated Plates

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